Department of Neighborhood Development

Neighborhood Housing Development Division

Design, Construction and Open Space Unit

RESIDENTIAL DESIGN STANDARDS

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PREFACE

The following preface has been provided to point out the updates and clarifications which have been made to the June 2008 version of the Residential Design Standards. No changes have been made to any of the dwelling unit dimensional standards. The goal is to update outdated information, remove redundancies and clarify common ambiguities.

- A minor clarification has been made to Architectural Services.
- Bidding Phase has been added under Project Reviews.
- Green Building and Sustainable Design categories have been added to organize similar topics under a common category. Reference to DND's certification process for LEED for HOMES has been edited for clarity.
- The Energy Star Qualified Homes section has been updated to reflect current Energy Star programs.
- A Rehabilitation and Preservation section has been added in order to communicate key design & construction related expectations and priorities.
- Reference to Boston Complete Streets and Grow Boston Greener has been added under Open Space and Trees and Landscaping respectively.
- General notes have been added to Multifamily and Single and Two Family Housing Dimensional Standards instead the notes in the previous document. Clarification was made to whether unit sizes are minimums or maximums. The repeated reference to exceptions was removed and placed under the Unit Modification Section.
- *"in One and Two Family Homes"* was removed from category Storm/Screen Combination Exterior Doors as storm/screen doors may also be required in multifamily dwellings.
- Flooring Finishes has been reformatted and edited.
- Ventilation has been updated to clarify multifamily expectations and the use of ERV/HRV systems where proposed.
- A closed circuit security camera system section has been added.

INTRODUCTION

DND has developed design standards for new construction and the rehabilitation of existing buildings to ensure that all projects conform to current applicable regulations, and to promote cost effective, environmentally-responsible, quality design. For each project reviewed by DND the goal is to achieve the highest quality product within the cost constraints of the project. The standards are based upon regulatory requirements imposed by the Department of Housing and Urban Development (HUD), under the State HOME program and CDBG Funding for home-ownership projects.

A major goal of DND design guidelines for new construction and rehabilitation projects is to encourage the creation and preservation of residential dwellings which:

- *Respect the architectural detailing such as corbels, dentil molding, columns, cornice detail, window/door pediment, etc prevalent in the neighborhood in new construction. Every effort is to be made to preserve or replicate such details in existing buildings.*
- *Are sensitive to the residential building types, existing massing, set backs, siting and openspace elements of the neighborhood.*
- *Results in cost effective construction.*
- *Results in low maintenance costs and energy efficiency for renters and homeowners.*
- *Use existing interior and exterior space to enhance the quality of life of the residents and neighbors.*
- *Minimizes environmental impact on City infrastructure and promotes public health.*
- *Minimizes environmental impact at the regional, national, and global level by reducing green house gas emissions and water use.*

PROCEDURES

The development team is encouraged to meet with DND prior to application for funding. Developers and architects should schedule a meeting with the Design Construction and Open space Unit (DCOSU) early in the conceptual design phase of a proposed project. This initial meeting will provide an opportunity to review the housing need being served, the programmatic goals, the siting of the development, sustainable design strategies, among other issues. A staff architect from the DCOSU will be assigned to the project to work with the development team and will provide ongoing design and cost saving technical assistance as required. Upon receipt of a proposed new construction or renovation project, DND will conduct a feasibility study in relation to design requirements, guidelines and project cost and subsidy.

PROJECT REVIEWS

The DND Design Review Policy outlines the specific submission requirements at initial application and at subsequent phases of design review. Projects shall receive Application, Schematic Design, Design Development, and Construction Document & Conditional Approval, and Design & Construction Approval at respective stages in the development of drawings, specifications, and construction costs based on compliance with these standards.

Bidding Phase

Development teams are to review the DND Bid Policy prior to submitting Construction Documents for Conditional Approval. The Bid Document Review process and Submission Requirements are outlined on the DND website under housing policies. A complete "Bid Package" including Section 3 requirements (also available online) must be reviewed by the assigned the Staff Architect prior to being sent to contractors.

ARCHITECTURAL SERVICES

The developer shall provide DND with written copies of the Standard Form of Agreement between Owner and the Architect (AIA B-Series form), verifying the commissioning of their architect for the project. In addition include the proposal for services, if the scope of professional services is not clearly outlined in the AIA documents.

This document will be provided to DND after the issuance of the Award Letter and with the submission of schematic drawings for Application and Schematic Design Review. The Project Architect shall provide full design services including, but not limited to, architectural, structural, mechanical, electrical, plumbing, civil, and landscaping drawings and specifications. Revisions to the drawings and specifications as a result of DND's design review process, cost cutting or "value engineering", community meetings and meetings with City agencies, are considered part of the design services. Weekly site visits are required during construction

OTHER AGENCY GUIDELINES

Projects shall comply with the design and construction requirements of other agencies including but not limited to the following list. Where there is a conflict, the more stringent requirement shall apply. DND will not review projects for compliance with other regulations; developers are required to seek the necessary public approvals for their projects.

- City of Boston Municipal Agencies; including BW/SC Site Plan Guidelines
- Department of Housing and Urban Development;
- Massachusetts Department of Public Health
- State HOME, HSF, FCF, and LIHTC programs;
- Boston Landmarks Commission;
- The Secretary Of The Interior's Standards For Rehabilitation;
- Massachusetts State Building Code (latest edition);
- Energy Star Homes Certification program
- Boston Zoning Code;
- Rules and Regulations of the Massachusetts Architectural Access Board;
- Federal Fair Housing Amendments Act;
- Massachusetts Fair Housing Law;
- Section 504 of the Federal Rehabilitation Act; Americans with Disabilities Act;
- Cost Effective Energy Conservation Standards: Design must meet HUD Cost-Effective Energy Standards in Rehabilitation Projects.
- Architectural Barriers Act;
- Uniform Federal Accessibility Standards (USAF)

GREEN BUILDING

SUSTAINABLE DESIGN

The City of Boston and DND recognize that buildings in their construction, operation, and maintenance have a substantial impact on the environment and the people who live within them. It is important to DND that buildings positively contribute to the human and environmental health of our residents and our neighborhoods as buildings consume large amounts energy, water and generate the majority of solid waste in the United States. Thus the sustainable design and green building practices which are embodied within the DND Residential Design Standards contribute to the city's efforts to decrease energy and water usage, reduce operating and maintenance cost, improve the efficiency and longevity of building systems.

ARTICLE 37

The City of Boston's Zoning Commission has adopted a Green Building article, Article 37, into the Zoning Code. Proposed developments under Article 80 Large Project review are subject to the provisions of Article 37. Up to four (4) of the required points may be obtained from the Boston Green Building Credits identified in Article 37, Appendix A and included in the calculation toward achieving a LEED certifiable project under the Article. The purpose of Article 37 is to ensure that major building projects are planned, designed, constructed, and managed to minimize adverse environmental impacts; to conserve natural resources; to promote sustainable development; and to enhance the quality of life in Boston. For Information on Article 37 consult the Boston Redevelopment Authority website under Zoning.

LEED FOR HOMES

LEED for Homes (including LEED for Homes Midrise) is the basic standard for DND Residential Construction for both new construction and renovation/rehabilitation of existing buildings. In addition Energy Star (ASHRAE 62.1, 62.2, 90.1 & 90.2) and Healthy Homes construction & material guidelines are prerequisite sustainable design and green building strategies which must be incorporated into all development proposals. (EQ4) (EQ5) The building design must demonstrate that the constructed building will meet or exceed LEED Silver and these prerequisites. Adherence to these design and construction strategies and their requirements are crucial to achieving the City's sustainability goals.

Certification

Actual "certification" by the USGBC is not required. The project team must demonstrate during the design review process and certify at the end of the construction that the building(s) have met all prerequisites and fulfilled criterion to reach the "Silver" certification level established by the USGBC. It is understood that the LEED certification entails a higher level of reporting and ongoing documentation. LEED certification is not being discouraged; simply the higher level of reporting and documentation required for LEED certification is not required under these guidelines. At application the development team will provide a checklist and a narrative describing the sustainability approaches within the project. The checklist and narrative must outline the LEED for Home credits that have been targeted, the number of points sought within each category and method/approaches employed within the building design and siting of the project to achieve the targeted credits. An updated checklist and narrative is required at each stage of design review and must be maintained through construction completion. *See Index of LEED-H rating categories.*

Integrated Design Workshop

During the schematic design phase, the project team is to conduct a full day integrated design workshop. The integrated project team should be composed of an architect, mechanical engineer, builder, civil engineer, and landscape architect or other engineers/consultants as required. Each member of the integrated team is to be familiar with green building and sustainable design principles. At least one member of the integrated team is to be a LEED accredited professional. The goal of the workshop will be to optimize the integration of the sustainability strategies with the building design and siting. DND design staff will attend this workshop. As a follow up to this workshop, the integrated team is to meet with the DND design and construction staff to review to the progress toward achieving sustainability goals outlined within this workshop. (ID1)

LEED Index

LEED-H Rating System Categories	**Credits**	
Innovation and Design Process (ID)		
ID1 - Integrated Project Planning	2	
ID2 - Durability Management Process	0	
ID3 - Innovative / Regional Design	0	
Location and Linkages (LL)		
LL1 – LEED-ND Neighborhood Design	0	
LL2 - Site Selection	2	
LL3 - Preferred Locations	3	
LL4 – Infrastructure	1	
LL5 - Community Resources & Public Transit	1-3	
LL6 - Access to Open Space	0-1	
Sustainable Sites (SS)		
SS1 - Site Stewardship	0	
SS2 - Landscaping	4-7	
SS3 - Local Heat Island Effects	0-1	
SS4 - Surface Water Management	3	
SS5 - Non-Toxic Pest Control	1.5-2	
SS6 - Compact Development	2-4	
Water Efficiency (WE)		
WE1 - Water Reuse	2-4	
WE2 - Irrigation System	3	
WE3 - Indoor Water Use	3-6	
Energy and Atmosphere (EA)		
EA1 - Energy Star Labeled Home	10-16	
EA2 - Insulation	2	
EA3 - Air Infiltration	0-3	
EA4 - Windows	2-3	
EA5 - Heating and Cooling Distribution System	2-3	
EA6 - Space Heating and Cooling	2-4	
EA7 - Water Heating	3-6	
EA8 - Lighting	3	
EA9 - Appliances	2-3	
EA10 - Renewable Energy	0	
EA11 - Residential Refrigerant Management	0-1	

Material and Resources (MR)		
MR1 - Material Efficient Framing	0.5-4	
MR2 - Environmentally Preferable	4-8	
MR3 - Waste Management	3	
Indoor Environmental Quality (IEQ)		
IEQ 1 - Energy Star with IAP	0-13	
IEQ 2 - Combustion Venting	0-2	
IEQ 3 - Moisture Control	0-1	
IEQ 4 - Outdoor Air Ventilation	2	
IEQ 5 - Local Exhaust	0-1	
IEQ 6 - Distribution of Space Heating and Cooling	0-1	
IEQ 7 - Air Filtering	0-2	
IEQ 8 - Contaminant Control	2-4	
IEQ 9 - Radon Protection	0	
IEQ 10 - Garage Pollutant Protection	1-3	
Awareness and Education (AE)		
AE1 - Education for Homeowner and / or Tenants	2	
AE2 - Education for Building Managers	1	

ENERGY STAR QUALIFIED HOMES

DND requires that affordable housing developments meet the US Environmental Protection Agency's (EPA) ENERGY STAR for Qualified New Homes guidelines, or its equivalent. Energy star provides technical assistance and requires in-field inspection & testing/verification by an independent Home Energy Rater for projects enrolled in the Energy star program. This requirement applies to both new construction and "gut" rehabilitation of existing buildings. Energy star homes are 15% to 20% more energy efficient than a home built to 2004 IRC International Residential Code and are to be designed to meet the efficiency performance standard of 85 or lower on the Home Energy Rating System (HERS) Index. All construction must be Energy Star Homes certified.

Recent Green Affordable Housing Program residential projects have achieved a HERS Index from 75 HERS to as low as 50 HERS. DND's expectation is that the majority of projects will be able to achieve a HERS Index between 70 and 65 HERS at minimum. (EA1)

There are two paths to qualify a home to meet ENERGY STAR's guidelines for energy efficiency. Both paths require independent verification and On-Site Inspection by a qualified Home Energy Rater:

ENERGY STAR Performance Path provides flexibility to select a custom combination of measures for each home that is equivalent in performance to the minimum requirements of the ENERGY STAR Reference Design Home. Equivalent performance is assessed through energy modeling.

ENERGY STAR Prescriptive Path provides a single set of measures that can be used to construct an ENERGY STAR qualified home. Modeling is not required; however, no tradeoffs are allowed.

Development teams must provide documentation of the project's enrollment and confirmation from Energy Star that the project qualifies for Energy Star when responding to DND request for proposals.

Qualified Homes

Energy star defines building types, which qualify for enrollment. These types and conditions are listed below. Refer to the Energy Star for more information. The following homes are eligible to earn the ENERGY STAR:

Detached Dwelling Units	eg. Single Family Homes
Dwelling Units in any Multifamily buildings with 4 units or fewer.	
Dwelling Units in Multifamily buildings	Three stories or fewer above grade
Dwelling Units in Multifamily buildings that have their own heating, cooling, and hot water systems, separate from other units.	Four or five stories above grade – dwelling units occupy 80% or more of the occupiable square footage of the building. Exclude commercial / retail space when assessing whether the 80% eligibility threshold has been met in mixed use buildings.

ENERGY STAR QUALIFIED MULTIFAMILY HIGH RISE BUILDINGS

DND requires that new or substantially rehabilitated Multifamily High Rise (MFHR) building must meet strict guidelines for energy efficiency set by EPA, making them designed to be at least 15% more energy efficient than MFHR buildings built to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007. The developer must provide EPA or its designated agent with program specific submittals. These submittals, which must be validated by a licensed professional, are used to demonstrate that the program's requirements have been met, that all prerequisites are included, and that each energy conservation measure is installed to specification.

The intended use of the building must be for residential purposes. Commercial facilities such as motels/hotels, nursing homes, assisted-living facilities, and dormitories are not eligible for the program

If the building includes both residential and commercial space, the residential and residential-associated common space must consist of more than 50% of the occupiable square footage of the entire building; and the residential space must be separately metered from the commercial space

Qualified Multifamily High Rise Buildings

The following new construction or substantially rehabilitated multifamily buildings are eligible to earn the ENERGY STAR:

Building Type 1	Multifamily buildings with 5 or more units AND Four or five stories AND Has a central heating, cooling or hot water system or The space occupied by dwelling units is less than 80% of the occupiable residential square footage of the building
Building Type 2	Multifamily buildings with 5 or more units AND 6 or more stories

NON-QUALIFIED ENERGY STAR PROJECTS

Residential development proposals, which do not qualify for energy star, must comply with energy efficiency performance criteria equivalent to Energy Star. Energy efficiency performance must meet or exceed ASHRAE 90.1-2007 (or current) by 20% or demonstrate comparable savings, when modeled according to Appendix G.

The performance of the building must be certified by an independent third party through on site field inspection and testing (equivalent to Energy Star Multifamiy Highrise Building Protocols.) The developer must discuss the strategy for certifying performance with DND.

Procedure

When applying for DND funds, developers must confirm that the proposed non-qualifying project will meet DND requirements by providing DND with the following information:

- The name and contact information for the "qualified" energy modeler conducting the energy assessment of the building and the name of company providing energy modeling services.
- The baseline, benchmark or reference design used for the energy model. This "baseline" must be equivalent to "baseline" criteria used by Energy Star.
- The name of company providing field inspection and testing on site and the name and contact information for the field inspector.
- A written description of the process of certification and in field inspection.

HEALTHY HOMES REQUIREMENTS

DND is also committed to reducing the impact of respiratory ailments such as asthma on families residing in units funded by the City of Boston. Recommendations of The New England Asthma Regional Council (ARC) and the Boston Urban Asthma Coalition (BUAC) have been incorporated into these Design Standards. All single or multi-family residential homes shall incorporate construction methods and materials that will minimize building conditions that are known to trigger asthma and respiratory problems of the occupants. Buildings are to be designed to keep it dry, clean, well ventilated, safe, free of contaminants, pest free and well maintained. (SS5)

CONSTRUCTION METHODS (ADVANCED BUILDING TECHNIQUES)

In projects with five or more total units, preference will be given to projects that primarily use either panelized construction technologies or are stick-built on site using advanced building techniques. Framing and estimating practices are to be used which limit (to 10% or less) the percentage of framing material order in excess of the estimated material required for construction. (MR1)**. RENEWABLE ENERGY & PHOTOVOLTAIC READY DESIGN**

DND's Green Affordable Housing Program works in collaboration with organizations such as the Massachusetts Technology Collaborative, Commonwealth Solar and others, to support the introduction of renewable energy technology into affordable housing. The use of renewable energy strategies is encouraged in all developments. In the event that renewable energy systems are not being implemented in a project, DND requires that the building design is "solar ready" such that solar electric and solar thermal systems can be easily installed at a later date. (EA10) The developer and architect are to anticipate the future introduction of solar technologies in the preliminary orientation and siting of the building. Development proposals must incorporate MEP conduit/chases; structural loads and anchoring needed to provide solar electric and solar thermal renewable energy systems in the future.

REHABILITATION AND PRESERVATION

Preservation project development teams are to provide DND with a comprehensive rehabilitation strategy, which combines the established 20-year Capital Needs Assessment (C.N.A.) with practical green building and energy performance recommendations. At Application, a C.N.A. and the replacement reserve analysis is to be provided which focuses on improving the quality of life of residents, ensuring the long-term stabilization of the building and protecting the health and safety of building occupants. Green building recommendations are to use LEED for Homes, Healthy Homes and Energy star as a basis and pay particular attention to improving poor indoor air quality, inadequate ventilation and other unhealthy interior conditions for residents. The energy performance assessment is to be used to evaluate where improvements can be made to reduce operating costs by improving the energy and water efficiency of the building(s). Considerable improvements can be obtained by providing workshops to introduce conservation strategies and healthy homes measures to residents.

UNIT MODIFICATION

Projects, which involve the renovation of existing buildings, must consult with the DND design staff to discuss the application of livability standards. Especially if adherence creates construction difficulty, substantially increases costs, and/or reduces the number of existing units. Development teams must clearly explain any need to modify the existing configuration of units. A unit inventory listing the unit, unit square footage and number of bedrooms is to be provided in order to assess the impact of reconfiguration on the existing unit mix.

ACCESSIBILITY & LIFE SAFETY

Development teams are to determine whether the renovation scope of work (when compared to the building value) triggers compliance with accessibility or life safety regulations.

CAPITAL NEEDS ASSESSMENT

The C.N.A. is to project the potential capital costs over a 20-year period using a quantity inventory of building components (including the age and expected life of these components), data on their current cost, assumed rates of inflation and a schedule of replacement. The C.N.A. must have been conducted less than 2 years prior to the submission to this application for funding. Projects with multiple buildings must complete a C.N.A. for each building.

A complete C.N.A. will include a detailed 20-year capital needs worksheet. A report summarizing the existing property conditions with color photos, a description of projected needs as reflected in the C.N.A. and final replacement recommendations are to accompany the worksheet. In addition applicants are to provide the following:

- A chart or (bar) graph to summarize costs in each building system or major work category between year 1-20 as recommended by the C.N.A.
- A narrative summary of the following priority areas as reflected by the immediate replacement recommendations in the C.N.A. This narrative is also to focus on life safety upgrades required by code:
    - Building Stabilization – exterior envelope, structure, egress
    - Mechanical, Electrical, Plumbing & Fire Protection Systems
    - Hazardous Materials & De-leading
    - Ventilation, Indoor Air Quality – bath, kitchen, common area
    - Interior Quality & Finish – including healthy homes

REPLACEMENT RESERVES

The replacement reserve analysis is to project the funds required for capital improvements over a 20-year period. The analysis should include the prior 3 to 5 years reserves. Each of the following documents is to

include a chart or (bar) graph to illustrate the analysis. Also include capital costs with the chart or graph for comparison:

- A replacement reserve projection based on existing reserves.
- A replacement reserve projection based on the reserves proposed in the rehabilitation strategy.

GREEN BUILDING/ ENERGY PERFORMANCE

Operating expenses are to specifically include utility cost for gas, electricity and water. Maintenance costs are to be included as an operating expense, if repairs to fixtures, heating equipment, appliances, lighting, etc. can be quantified. An analysis of existing operating costs should include historical trends 3 to 5 years prior and an energy audit conducted by a qualified energy auditor or home energy rater. More extensive thermal imaging and deconstructive exploration is to be conducted when known deficiencies exist in the building envelope (roof, floors, exterior walls, etc.) Operating savings are to be determined from identifying where "energy" improvements have the greatest cost benefit (life cycle cost compared to payback period.) These operating savings are to be projected over a 20-year period based on the rehabilitation strategy.

A complete assessment will include a summary of the "green" and "energy" improvements with a description of expected resident benefits, operating cost reductions including utility savings. In addition thermal imaging, investigative photos & reports from the energy audit and detailed spreadsheets analyzing existing operating expenses and proposed operating savings (cost benefits) are to be provided. In addition applicants are to provide the following:

- A 20-year projection of operating cost savings based on the rehabilitation strategy.

REHABILITATION STRATEGY SUMMARY CHART

A chart or (bar) graph, which combines operational savings, replacement reserves and capital, needs over a 20-year period in a single illustration. Capital needs improvements are to be broken into categories based on the rehabilitation strategy. This graph is to reflect an understanding of the fund allocation within the capital improvements in comparison to the funds/savings allocated to replacement reserves.

NEIGHBORHOOD COMPATIBILITY

SITE DESIGN

It is a primary concern of DND and residents of Boston that all housing developments fit into and enhance existing neighborhoods. The following building and site design standards explain the key issues that determine neighborhood compatibility.

SITE SELECTION

In general, sites available for development are within the context of existing communities. Each of these neighborhoods has over time developed a unique character. DND encourages development which builds upon the uniqueness of these neighborhoods. Proposals for new developments should seek to infill and knit together the residential fabric, creates communal open space and preserve existing residential opportunities within Boston's neighborhoods. Existing publicly accessible or community-based open space, public transit and other basic community resources should be located within walking distance of any proposed development. (LL3 & LL4 & LL5 & LL6 & SS6)

Development on environmentally sensitive sites such as land whose elevation is lower than the 100 year flood plain, areas designated as habitat for threatened or endangered species, areas within 100 feet of water & wetlands are regulated by local, state and federal regulations. (LL2)

PLACEMENT OF BUILDINGS ON SITES

New buildings shall align with the front edge of existing buildings along a street. At a corner, buildings shall be placed to align with existing buildings facing both streets. On blocks without existing buildings, new buildings shall be placed in accordance with other buildings on adjacent blocks. Buildings shall be oriented with their narrow dimension along the street edge and their long dimension perpendicular to the street edge.

BUILDING PROPORTION & ORIENTATION

Width and height proportions of new buildings shall be similar to the traditional pattern of buildings found on adjacent streets. Boston residential buildings traditionally have a vertical proportion (taller than they are wide) and building elements (doors, windows, bay projections) all have similar vertical proportions.

When appropriate to the context, buildings should be placed on the site giving consideration to optimum solar orientation, and wind direction for natural ventilation and wind buffering. Methods for providing summer shading for south-facing walls and the implementation of photovoltaic systems on the south-facing area of the roof are to be considered. (ID1)

STREET BOUNDARIES

Use of clear boundaries to define public and private space can create a sense of security and comfort in dense urban neighborhoods. The public (sidewalk edge) boundary of the property shall be defined using fencing, walls, hedges, line of trees, or other landscape material. Use of black vinyl covered chain link fencing is restricted to property edges that do not face a public street. Fencing material and height should match or complement fencing in the neighborhood.

OPEN SPACE

It is important that development proposals design open space for residents particularly for families and children who occupy the building(s). Areas for active and passive outdoor activities such as play space, sitting areas, and areas dedicated for gardening are to be provided. In addition the public face of the project is to improve the quality of life along the street creating public spaces which are both accessible and sustainable. Development proposals must comply with Boston Complete Streets (Boston Transportation Department.)

TREES AND LANDSCAPING

Grow Boston Greener (GBG) is a collaborative effort of the City of Boston and Boston Natural Areas Network to increase the urban tree canopy cover in the city by planting 100,000 trees by 2020**.** Development teams are encouraged to contact GBG to inquire about adding additional trees to both existing and proposed developments. Street trees are typically not provided by the GBG program.

Existing mature and healthy trees shall be preserved wherever possible. Existing one and two family dwellings shall have a minimum of one shade tree, (3 inch caliper minimum) planted at the street edge and one flowering tree, (3 inch caliper minimum) planted in the rear yard of each property, four 5-gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed site area (including the area under roof). (SS4) If portions of the lot are located on a steep slope, control erosion and reduce long-term runoff effects through use of terracing and retaining walls. (SS1) (SS4)

Landscaping shall compliment the building and maximize the use of open space. All new planting shall be allergy reducing. (SS4) Landscaping on larger projects should be compatible with the neighborhood, provide an important visual amenity to the residents and provide adequate dedicated space for children to play. In addition the landscape elements should be designed to reduce the heat island effect, assist in storm water management of the site and reduce the overall irrigation water demand and water budget. (WE2) (SS3) (SS4)

New landscaping materials and vegetation should conform to xeriscaping standards – a low maintenance landscaping methods which use (SS2) 90% or more indigenous species that are drought-tolerant to conserve water used for irrigation to 20% or more reduction. Native plants and trees should be used. (SS2)

Existing rows of trees along a street shall be maintained. All sites shall be landscaped with lawns at all unpaved surfaces and plantings along the existing building foundation at street facing elevations. Alternately, and preferable, developers will pursue alternatives to lawns including drought resistant turf and wildflowers. Vegetative gardens (above ground) in conjunction with rainwater collection for irrigation should also be pursued. The use of conventional turf should be limited to 20% or less of the total landscape area. Do not use turf in densely shaded areas and in areas with a slope of 25%. Add mulch or soil amendments as appropriate. All compacted soil must be tilled to at least 6 inches. (SS2)

The goal of these strategies should be to reduce overall irrigation demand by at least 55% of the overall irrigation water demand water budget. The estimates must be calculated and prepared by a landscape professional. (WE2)

PARKING

The zoning requirements for off-street parking shall be achieved with parking layouts designed to minimize curb cuts and minimize area of pavement (impervious surfaces). Side by side driveways shall be avoided, and views from the public street edge of parking lots and cars shall be reduced to a minimum.

HEAT ISLAND EFFECT

To reduce "heat island" effect highly reflective paving materials with a solar reflective index of at least 29 should be used. At least 50% of parking spaces for larger developments should be located in a shaded area, either underground, under a deck, or under a mature tree. Light colored, high-albedo materials such as white or grey concrete should be installed. Trees and other plantings are to be located on the site in order to provide summer shading (shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth) for sidewalks, patios, and driveways. Where feasible, parking lots for large developments shall be located in the shadow of the development and buffered from adjacent properties with landscaping. (SS3)

STORM WATER MANAGEMENT

At least 80% of the site (not located under the roof) is to be permeable or designed to capture water runoff for infiltration on-site. In addition to vegetative landscapes, parking lots are a key way to manage on-site filtration of storm water, strategies like buffer strips and vegetative swales, on-site rain garden, rainwater cistern and pervious pavers should be used. The desired outcome is that hardscape areas do not contribute to net runoff. (SS4)

EXTERIOR BUILDING DESIGN

GENERAL PRINCIPLES

Layout of buildings and units shall meet the following general design principles:

- Combination storm/screen doors shall be provided on exterior doors in proposed detached 1-3 family rental units to improve cross ventilation and natural light in living spaces.

- Canopies or roofs or other weather protection shall be provided above all exterior doors.
- Decks/platforms below small roofs or canopies shall be framed to provide a step down to the deck.
- Sliding doors or windows shall be avoided.
- Exterior bulkhead access shall be provided in to basements of single, duplex, and two family dwellings in new construction.
- Mailboxes shall be located at front entrances, fastened to painted plinth blocking.
- Front walkways shall connect directly to the sidewalk and shall be sloped ¼ inch per foot away from building in new construction.
- Walkways shall be provided to secondary exterior doors and shall be sloped ¼ inch per foot away from building in new construction.
- Side and rear yards shall be enclosed with vinyl covered chain link fencing for detached 1-3 family buildings.

EXTERIOR DETAIL

Final exterior building elevations shall have exterior details of quality and dimension equal to or better than existing buildings in the neighborhood. Damaged exterior details shall be rebuilt or replaced. Design of new, exterior details shall carefully consider function, materials, and maintenance and may include corner boards, window/door trim, frieze boards, skirt boards, columns, brackets, and railings. **Note:** the use of lead coated copper (LCC) decorative panels is forbidden without written approval from DND.

EXTERIOR BUILDING MATERIALS

New building materials visible from public streets shall be of equal quality or better than materials on existing buildings in the neighborhood or on the existing building. Pressure preservative treated wood (except for framing not visible), basement bulkheads, or mechanical equipment shall not be placed on street facing elevations or other highly visible locations. Use alternatives to CCA – chromated copper arsenate-treated wood. **Note**: the use of lead coated copper (LCC) decorative panels is forbidden without written approval from DND.

BUILDING ENTRANCES

The first floors of typical Boston dwellings are raised above the curb 36 – 60 inches to provide a sense of separation between public and private spaces. New residential entrances shall be raised above the sidewalk to be similar to other properties in the neighborhood. Natural surveillance shall be used to discourage crime (i.e., entrances, parking, and walkways shall be visible from inside units and the street). Units requiring accessibility according to Massachusetts Architectural Access Board are to develop site-grading strategies using 1:20 walkways and ramps. Ramps in one and two family construction are to be limited to no greater than 30 feet.

FRONT PORCHES

Front porches for detached 1-3 family buildings are required in neighborhoods where existing houses have front porches. Porches for multi-family projects will be reviewed for neighborhood compatibility.

LIVABILITY

INTERIOR LAYOUT & DESIGN

The following items address issues that have been raised by Boston residents concerning dwelling use, furniture layout, flexibility, future expansion options, and general comfort.

GENERAL PRINCIPLES

Layout of buildings and units should meet the following general principles:

- Circulation space shall be designed efficiently and kept to a minimum.
- Avoid plumbing on exterior walls.
- Bathrooms shall not open onto living/dining spaces.
- Coat closets shall be located near dwelling entrances.
- Access to rooms shall be from circulation spaces and not directly through the kitchen.
- Window location shall provide for cross ventilation in rooms (where possible) and through units
- Buildings shall provide visual and noise barriers between public and private spaces. Minimum sound control (STC-50) between units and public hallways or common spaces shall be provided.
- Basements shall be provided in new construction unless subsurface soil conditions are unsuitable and costly to remove. If basement are not provided, adequate storage space shall be provided.
- Windows shall be provided in basements. (EA4) Window wells are not permitted.

MULTI-FAMILY HOUSING DIMENSIONAL STANDARDS

General

The unit sizes at the sizes listed are minimum square footages.

Apartments containing an interior stair between two or more floors within a unit, add 50 square feet per floor to the minimum square footage requirements.

The maximum square footage (with DND approval) may be reduced if additional private basement storage for each apartment is provided. If basement storage is provided, shelving shall be installed to keep items off basement floor.

Net Square Footage is measured from the centerline of the exterior wall, and includes usable storage space, stairwells and hallways inside the unit, as well as space occupied by interior walls. Net Square Footage does not include basement or attic storage areas, common stairwells, and common hallways. However, Net Square Footage does include 50% of the area under sloped ceilings with greater than 5'-0" clearance and less than 7'-6" clearance.

UNIT SIZES

Studios shall be approximately 500 net sq.ft.

1 Br. shall be approximately 750 net sq.ft

2 Br. shall be approximately 900 net sq.ft.

3 Br. shall be approximately 1,200 net sq.ft.

4 Br. shall be approximately 1,400 net sq.ft.

MINIMUM ROOM SIZE

Use/Room	Min. Area	Min. Dim.
Living Room	150 SF	12'-0"
Dining Room	100 SF	10'-0"
Living/Dining (1 Bed)	200 SF	12'-0"

Living/Dining (2 Bed)	225 SF	12'-0"
Primary Bedroom	120 SF	11'-0"
Secondary Bedroom	100 SF	9'-0"
Full Bath	35 SF	5'-0"
Hallways	N/A	3'-0"
Coat Closet	6 SF	2'-0"
Bedroom Closets	8 SF	2'-0"
Linen Closets	4 SF	1'-6"
Storage (basement. or other)	30 SF	2'-0"

MINIMUM NUMBER OF BATHROOMS

2 Br. unit shall have 1 full bathroom.

3 Br. unit shall have 1-1/2 bathrooms.

4-or-more-Br. unit shall have 2 full bathrooms.

MINIMUM KITCHEN COUNTER SPACE

Do not include the sink or stove in the measurement of the linear footage. Linear footage should be counted from the front face of the counter.

Studio unit shall have at least 4 linear feet.

1Br. unit shall have at least 6 linear feet.

2 Br. unit shall have at least 8 linear feet.

3 Br. unit shall have at least 10 linear feet.

4+ Br. unit shall have at least 12 linear feet.

SINGLE & TWO FAMILY HOUSING DIMENSIONAL STANDARDS

General

The unit sizes at the sizes listed are maximum square footages.

Gross Square Footage is measured from the exterior face of the exterior wall, and includes usable storage space and hallways inside the unit, as well as space occupied by interior walls. Gross Square Footage does not include basement or unfinished attics, porches, common stairwells, and common hallways. However, Gross Square Footage does include 50% of the area under sloped ceilings with greater than 5'-0" clearance and less than 7'-6" clearance.

For units containing an interior stair between two or more floors within the unit, add 50 square feet per floor to the maximum square footage requirements.

With DND approval, the maximum square footage may be reduced if basement storage per unit is provided.

UNIT SIZE

2 Br. in a two family shall not be greater than 1,000 gross sq. ft.

3 Br. in a two family shall not be greater than 1,200 gross sq. ft.

3 Br. Duplex shall not be greater than 1,300 gross sq. ft.

3 Br. Single-family shall not be greater than 1,400 gross sq. ft.

MINIMUM ROOM SIZE

Use/Room	Min. Area	Min. Dim.
Living Room	150 SF	12'-0"
Dining Room	120 SF	10'-0"

Living/Dining	225 SF	12'-0"	
Primary Bedroom	120 SF	10'-6"	
Secondary Bedrooms	100 SF	9'-0"	
Full Bath	35 SF	5'-0"	
Hallways	N/A	3'-0"	
Coat Closet	6 SF	2'-0"	
Bedroom Closets	8 SF	2'-0"	
Linen Closets	4 SF	1'-6"	
Storage (bsmnt. or other)	30 SF	2'-0"	

NUMBER OF BATHROOMS

2 Br. unit shall have one full bathroom.

3 Br. unit shall have 1 ½ bathrooms.

4-or-more-Br. unit shall have 2 full bathrooms.

MINIMUM KITCHEN COUNTER SPACE

Do not include the sink or stove in the measurement of the linear footage. Linear footage should be counted from the front face of the counter.

2 Br. unit shall have at least 8 linear feet.

3 Br. unit shall have at least 10 linear feet.

4+Br. unit shall have at least 12 linear feet.

SINGLE PERSON OCCUPANCIES (SPO)

SPO Housing is defined as a residential property that includes single room dwelling units. Each unit is for occupancy by a single eligible individual.

SPO Type 1, 2 and 3 are to be furnished with a Single bed space, Dresser, Mirror, Nightstand, Writing desk, 2 chairs, Small table and a Shelf with space for TV/Radio. SPO Type 4 is to be furnished with a Single bed space, Dresser, Mirror, Nightstand, Writing desk, 2 chairs, a Dining table, 4 chairs and a Shelf with space for TV/Radio.

The four (4) SPO types are described below:

SPO TYPE 1

Unit Description: SPO with no cooking facilities within the unit, no private bath, but does include congregate dining and on-site support facilities such as TV room, reading areas, community living rooms, etc. A small sink, under counter refrigerator, and microwave oven may be permitted within the SPO. The following spaces shall be provided.

Minimum SF: 165 square feet

- Basic unit – 150 SF
- Closet – 15 SF
- *See required furnishing above*

SPO TYPE 2

Unit Description: SPO with no cooking facilities within the unit but includes a private bath with shower, and congregate dining and on-site support facilities such as TV room, reading areas, community living rooms, etc. A small sink, under counter refrigerator, and microwave oven may be permitted within the SPO. The following spaces shall be provided.

Minimum SF: 205 square feet

- Basic unit - 150 SF
- Closet -15 SF
- Bathroom – 40 SF
- *See required furnishing above*

SPO TYPE 3

Unit Description: SPO with cooking facilities within the unit and includes a private bath with shower and no congregate dining but includes on-site support facilities such as TV room, reading areas, community living rooms, etc. It is assumed the cooking facilities include a sink, 2 linear feet counter, 2 burner stove and an under counter refrigerator. The following spaces shall be provided.

Minimum SF: 240 square feet

- Basic unit - 150 SF
- Closet -15 SF
- Bathroom – 40 SF
- Cooking facilities – 35 SF (this square footage includes 3’ clearance in front of counter)
- *See required furnishing above*

SPO TYPE 4

Unit Description: SPO with full kitchen within the unit and includes a private bath with shower and no congregate dining and no on-site support facilities such as TV room, reading areas, community living rooms, etc. It is assumed the cooking facilities include a sink, 2 linear feet of counter, small 4 burner stove and a 12 cu. ft. upright refrigerator. This resident may require off site special needs.)

Minimum SF: 340 square feet

- Basic unit - 240 SF
- Closet -25 SF
- Bathroom – 40 SF
- Cooking facilities – 35 SF (this square footage includes 3’ clearance in front of counter)
- *See required furnishing above*

ARTIST LIVE/ WORK HOUSING

The minimum level of fit-out that is required to obtain a Certificate of Occupancy Permit from the Inspectional Services Department and meets the artists' needs for open and flexible space is desired. Proposed housing for artists which includes space for their work shall meet the following requirements:

UNIT SIZE

A minimum of 1,000 sq.ft. of live/work space for one artist is required.

Work-only space must be 150 sq.ft. minimum.

INTERIOR LAYOUT

Studios and hallways shall be oversized in width to accommodate shipping of large works.

Loading bays shall be located directly adjacent to a direct route to elevators.

Freight elevators shall be provided to carry oversize/overweight objects; and allow for noise, weekend and late night deliveries.

All spaces shall be ADA adaptable and a reasonable number shall be ADA accessible.

Shared baths/kitchens may be considered for selected units.

The window to room ratio shall be adequate for natural light. The ideal source of light for workspace is from the North. Interior or "borrowed light" is important for deep spaces. Track lighting for studio photography, dance, and theater is preferred.

Ceiling heights shall allow for the creation of large works and large equipment, including machinery and lighting.

SOUND AND LOADING REQUIREMENTS

Wall and floor construction shall have adequate sound insulation to prevent the transmission of sound from machinery, equipment, or repetitive tasks.

Floors shall be constructed to provide extra weight-bearing capacity. Highly finished floors are not required. Sprung wood floors for dance/theater performers shall be included as an upgrade.

MEP AND FIRE PROTECTION

Plumbing shall include an easy installation of service sinks if required.

Units shall be fully wired for new technologies.

Electrical capacity shall meet the various needs of different art forms.

Live/work space, particularly those where there are children living in the unit, shall include an appropriate fire rated separation between the live and work areas.

Fire protection systems shall include the ability to address industrial accidents.

Fire insulation shall be adequate for open flames.

Special ventilation and air handling techniques shall be tailored to ensure the safety and health of residents, visitors, and neighbors. All workspaces shall be vented via the outside wall while providing a central ventilation system to the roof.

COMMON AREAS

Oversized dumpster capacity shall be provided.

Containers shall be provided for the disposal of toxic/hazardous materials (turpentine, paints, etc.)

Common space or meeting space shall include display space for both art work and rehearsal.

Access for outdoor work area shall be provided to all tenants.

Security shall reflect the needs of artists who may have on-site sales, employees, and customers.

HUD SECTION 202 PROGRAM

DESIGN STANDARDS

5% of the units and all community facilities common areas must be designed to meet Uniform Federal Accessibility Standards (UFAS) and HUD's implementing regulations at 24 CFR Part 40, Appendix A or an equivalent or more stricter standard, and Section 504 of the Rehabilitation Act of 1973 and HUD's implementing regulations at 24 CFR Part 8. An additional 2% must be designed to meet the needs of persons with visual and/or hearing impairments. All new construction must also comply with the design and construction requirements of the Fair Housing Act and HUD's implementing regulations at 24 CFR Part 100.

UNIT TYPES

Residence units for the elderly are limited to efficiencies or one-bedroom units. If a resident manager is proposed, up to a two-bedroom unit may be provided.

MAXIMUM UNIT SIZE

- Net rentable square footage for efficiency units– **415 square feet**
- Net rentable square footage for one-bedroom units – **540 square feet**
- Net rentable square footage for two-bedroom (manager's unit) – **750 square feet**
- *Only one bath permitted per unit.*

COMMUNITY SPACES

Community spaces may not exceed 10% of the gross square footage without HUD approval.

RESTRICTIONS ON AMENITIES

Amenities not eligible for HUD funding include individual unit balconies and decks, atriums, swimming pools, saunas, and Jacuzzis. Also trash compactors, and washers and dryers in individual units will not be funded.

A small multipurpose room may be provided for emergency use, but not overnight cars. No staffing provisions may be made for doctors, nurses, or other medical personnel. Project facilities may not include commercial spaces, infirmaries, nursing stations, and spaces for overnight care.

LONG TERM RESIDENTIAL CARE FACILITIES

(**Level IV** per Massachusetts Department of Public Health – see 105 CMR 150.000 to 159.000 for additional specific requirements)

GENERAL

- No more than 60 beds in an "Identifiable Unit".

SITE

- Parking Per zoning or 1 space per 4 beds minimum
- 2 handicapped parking spaces minimum located near main entrance (12' wide min.).
- Public walks shall be 4' wide minimum with a gradient of no more than 8% (1:12)
- Outdoor recreational area of at least 25 square feet per bed & wheelchair accessible.
- Separate entrances for ambulance, kitchen, and delivery/receiving.

INTERIOR REQUIREMENTS

Administrative Offices:

- Appropriate space for administrative activities and storage of medical records
- Administrator's office – 80 sf min.
- Consultant(s) office – 100 sf min.

Public Telephone (s)

- Locate in separate room or alcove
- Handicapped accessible

Visitor's Toilets:

- Locate near entrance/lobby
- Provide one handicapped accessible toilet for each sex.
- Provide impervious wall finishes (72" high) and impervious floor
- Provide night lights

Staff Toilets:

- Locate near kitchen and staff locker rooms
- Shall not open directly into food preparation areas
- Provide impervious wall finishes (72" high) and impervious floor
- Provide night lights

Central Kitchen:

- Food prep. 5 square feet per bed minimum (not including food storage areas, dishwashing area, janitor's closet, refrigeration space, delivery and receiving areas, and administration space.)
- Separate entrance required
- Provide food receiving area
- Kitchen shall include hand-washing sink, double-compartment sink with 30" drainboard for vegetable preparation, triple-compartment sink with 30" drainboard each side for pot washing, floor drain with grease trap.

- Dishwashing area shall contain commercial dishwasher with grease trap and dirty and clean work counters. Provide direct entrance from corridor.
- Food carts with soiled dishes shall not access through food preparation areas.
- Minimum aisle width shall be 42" (60" where mobile equipment is used.)
- Traffic through kitchen shall be limited to authorized personnel.
- Provide a separate area for food cart washing and can washing.
- Provide an office for dietitian (100 sf min.) and food service manager
- Provide a separate janitor's closet with shelving for kitchen use (25 sf min.)
- Provide enclosed cabinets for dishes, silverware, and eating utensils.
- Kitchen doors shall be 42" minimum
- Provide impervious wall finishes (72" high) and impervious floor.
- Provide 1 ½ cu.ft. refrigeration and ½ cu.ft. freezer for each bed.

Central Dining:

- Provide 10 square feet per bed minimum.
- Provide exposure to outside.
- Provide separate dining for staff and employees.

Nourishment Kitchen:

- Provide on each floor and contain a refrigerator, surface cooking unit, toaster, sink, and storage cabinets.
- Provide impervious wall finishes (72" high) and impervious floor

Laundry Room (if laundry service is not provided):

- 70 square feet minimum with washer, dryer, double-compartment tub and storage for laundry supplies.

Corridors:

- 8 feet wide minimum for patient use. All others 5 feet wide minimum
- Provide handrail on both sides of corridors – 30" AFF with returns.
- Provide night lights.

Interior Ramps:

- Provide handrails both sides
- Gradient shall be not more than 8% (1:12).

Stairs:

- Risers should not exceed 7 inches.
- Provide night lights.

Elevators:

- Provide one hospital type elevator if patients housed above street floor
- If patient services are located in the basement or below grade, provide one hospital type elevator to this level.
- If more than 82 beds, provide 2 elevators at least one shall be hospital type.
- Minimum cab dimension shall be 5'-0" x 7'-6" and door width shall be 44" minimum.

Doors:

- All doors used by patients shall be 44" wide minimum except toilet room doors (32" minimum)
- Locks on patient doors are forbidden

Windows:

- Total glass area in patient rooms shall not be less than 10% of the floor area
- Operable area of window openings shall not be less than 4% of floor area (except fully air conditioned areas).
- Provide removable window guards at windows with sills less than 30" AFF
- Provide screens at all operable windows.
- Window units shall be ENERGY STAR rated.

Attendant's Station:

- Shall be located no more than 100 feet from entrance to any patient room.
- 81 square feet minimum with no dimension less than 6 feet.
- Must contain top and base cabinets, desk or counter, and chart racks.
- Attendant's toilet room shall be convenient to attendant's station.
- Provide night lights

Medicine Closet:

- Locate immediately adjacent to attendant's station
- Provide a separate locked compartment for the storage of narcotics and other dangerous drugs.
- Provide a refrigerator for medications.
- Provide a top and base cabinet with a countertop and a sink with hot and cold water.

Special Care Room:

- Provide one single bedroom in close proximity to attendant's station
- This room shall not have direct access to other patient rooms
- Provide recessed night lights 12" AFF.

Central Linen Storage:

- Provide in each facility
- Minimum 6 feet x 9 feet
- Shelves shall be 18" deep

Soiled Linen Closet:

- Provide in each facility
- Minimum 6 feet x 9 feet
- Provide hand washing facilities

Linen Closet:

- 20 square feet minimum in each unit.
- Provide non-combustible shelving to a maximum height of 6 feet.

Janitor's Closet – 1 per floor:

- Provide a service sink with hot and cold water

- 5 feet x 5 feet minimum with shelving

General Storage Room:

- 10 square feet per bed minimum
- Direct access from corridor

General Storage Closet:

- Minimum 50 square feet per unit for supplies and equipment.

Central Food Storage:

- 150 square feet minimum
- Provide non-combustible shelving not more than 18" deep x 72" high

Activities Area:

- Provide one day room, solarium, sitting room or equivalent space in each unit.
- Provide 9 square feet minimum for each bed.

General Activity Room:

- Provide 8 square feet per bed minimum, outside windows, and closet for storage of equipment.

Beauty Parlor and Barber Shop:

- Needs DPH approval.
- If approved, 120 square feet minimum.

Patient Bedroom (not including closets, vestibules, and toilet areas):

- 125 square feet minimum for single occupancy room
- 90 square feet per bed for multiple occupancy rooms
- No room shall contain more than 4 beds and no more than 3 beds side by side parallel to window wall.
- 3 feet minimum from bed to lateral wall or adjacent bed and 4 feet clear minimum at foot of bed
- Each patient closet shall be 2 feet x 2 feet minimum with 5 feet clear hanging space.
- Each patient bureau shall not be less than 2 feet wide with 1 drawer minimum. Each patient bedroom shall be sized to accommodate a household size or hospital-type bed, a bedside cabinet and an easy chair.
- Identifiable units shall not encompass beds on more than one floor.
- Provide impervious wall finishes (72" high) and impervious floor at bathrooms
- Provide recessed night lights 12" AFF

Patient Bathrooms:

- Provide bathing facilities in a ratio of not less than one per 15 patients. (Free standing tubs not required.)
- Showers shall be flush without curbs and with controls mounted outside the shower. Shower shall be 4 feet x 4 feet minimum.
- Provide one toilet and one lavatory between each adjacent room at a minimum. They shall be directly accessible from each room.
- Provide handicapped accessible toilet and lavatory for each sex in an area accessible to all patients and near dining and activity rooms.
- All tubs, showers, and toilet enclosures shall be equipped with grab bars.
- Provide impervious wall finishes (72" high) and impervious floor.

- Provide recessed night lights 12” AFF

Snack Shop:

- Needs DPH approval.

Gift Shop:

- Needs DPH approval.

MINIMUM STANDARDS OF QUALITY FOR RESIDENTIAL DESIGN

The following standards are minimum requirements for the use of materials and specifications applied to new construction and the rehabilitation of existing structures. This should be read carefully to avoid delays in design and construction of projects. **NOTE**: When the phrase **or approved equal** is used, it means that any substitution of product must be first approved by DND prior to ordering that substitution. A manufacturer's specification sheet is required for comparison of products.

DIVISION 1: GENERAL CONDITIONS

All construction permits and fees necessary for construction including street openings, sidewalk and street repairs, and opening of guaranteed streets are the responsibility of the Developer. Note: The developer is to determine if any proposed construction is on a street scheduled for reconstruction or on a guaranteed street. The construction budget is to include any additional cost if required. The General Contractor is responsible for Certificates of Insurance from all sub-contractors. All work shall be warranted for a minimum of one year after substantial completion. General Contractor's insurance against theft and damages is also required. City of Boston project sign is required on all sites.

WASTE MANAGEMENT

Diverting as much waste away from landfills as possible is an important green building and environmental protection goal. Increasingly, due to the escalation in tipping fees, waste management strategies are a financially prudent strategy. Investigate and document local options for diversion of all anticipated major constituents of the project waste stream, including cardboard packaging and household recyclables, which lead to a diversion rate of 25% or more.

Document the diversion rate for construction waste. Record the diversion rate for land clearing and/or demolition, separately from the rate for the new construction phase of the project. DND design staff is available to work with architects and contractors to develop a construction waste management plan and to identify end markets for construction waste and debris. (MR3)

CONSTRUCTION SITE SECURITY

It is the General Contractor's responsibility to provide site security and to prevent loss or damage from vandalism or theft during construction of projects after hours and/or including weekends and holidays. Site security shall be carried as a line item in 'soft costs', under General Conditions, and shall not be a consideration *after* damage or theft has occurred.

WINTER CONDITIONS

Provisions for construction during the winter months are to be anticipated by the development team and incorporated into the contractor's contract with the owner.

DIVISION 2: SITEWORK

DEMOLITION

The removal of all hazardous materials such as asbestos (ACM's) and lead based paint (LCM's) shall be carried out according to all applicable State and Federal regulations, including but not limited to the Mass. Dept. of Public Health, Mass. Dept. of Environmental Protection and U.S. Environmental Protection Agency, either prior to commitment from DND, or as part of proposed work to be executed. The Developer shall have a complete understanding of the scope of structural repairs required (if any). This shall be reflected in the budget.

Consult with DND De-leading Program for methods to remove paint effectively without eliminating architectural details.

Efforts should made to divert construction and demolition debris from landfill by recycling reusable materials

Soil Remediation – 21-E's

If soil remediation is required, a summary and an accurate estimate of the 21-E soil remediation plan shall be provided. Soil testing and remediation shall be approved by DND prior to execution. This is not a hard cost contingency item and shall be budgeted as a separate line item. Grading plans are required.

LANDSCAPE FEATURES

A landscaping plan shall include detailed drawings of landscaping, i.e., fencing, planting beds, trees and shrubs (species and sizes) retained and removed, play areas, lighting, seating and all features adding to the aesthetic quality of the site and optimizing the use of the existing property. Planting will not be permitted in July or August unless an appropriate watering/maintenance plan is provided. All plant material shall be warranted for one year.

All new landscaping shall conform to a low maintenance landscaping method, which uses indigenous species that are drought-tolerant to conserve water used if an irrigation system is proposed. If an irrigation system is proposed, drip irrigation systems should be considered. Systems on automatic timers should be monitored so that they are not watering during inclement weather. (SS2) (SS4) (WE2)

Rainwater Harvesting System

Rainwater collection systems are to be used to offset the water required for landscape irrigation. Applicants should strongly consider the use of rainwater collection barrels to provide non-potable water for irrigation purposes. Rainwater harvesting systems should be designed to capture 50% of the total roof area (including surface runoff and/or roof runoff) for landscape irrigation use. The storage system is to be sized to hold all the water from a 1-inch rainfall event. (WE1)

Landscaping

Walkways: Provide the following or better: a 4 ft wide concrete walk, 4" thick 4,000 psi (air-entrained) w/ broom finish, set on a 6" base of 3/4" crushed stone at all front entrances. Bituminous concrete may be used for rear entrances.

The use of recharge strategies and/or permeable paving materials is encouraged where possible.

Loam/Grass: Apply clean screened loam as needed to provide a 6" minimum deep planting bed, raked free of stones, 1" or larger, building debris and other non-organic materials. Apply fertilizer and grass seed and water for 2 weeks, (or through acceptance). Seed shall match sun exposure. The use of native, drought-tolerant grass species is encouraged where possible. Cut as necessary. *Hydroseeding shall be done only with specific DND approval. When hydroseeding (hydraulic application) new lawns, the acceptable slurry application rate is 1,500 Lbs., dry weight, per acre using a non-asphaltic tackifier. The seed mixture shall match the sunlight exposure, i.e., full sun, partial shade or full shade.* All lawns shall be maintained by the GC until after the first mowing. 6" plant cover shall be maintained at sloped areas which are prone to washout. Avoid leaving straight sloped areas, instead try to include landform grading which is more resistant to erosion. (SS2) (SS4)

Planting per existing one or two family house(or per unit in a duplex): Plant one shade tree with a caliper width not less than 3" diameter. Plant one flowering tree with a caliper width of not less than 3" diameter. Trees shall be fully staked and shall meet AAN Standards. Plant ten (10) ornamental shrubs, spaced appropriate to their mature dimension (usually not less than 3 FT apart). Watering should continue throughout the first season or 6 months. All plant material shall be allergy reducing. (Shade should protect either/both building or paved area.) (SS3)

Street Trees: On street fronts where there is an existing line (3 or more) of street trees either within the sidewalk or along the property line, provide if missing, one tree per 25 FT of street frontage. The tree shall match the existing street trees in type and planting detail. The caliper width shall be not less than 3" diameter.

UTILITIES

Prior to submission to DND, a survey of all existing utilities, including electrical (overhead and underground), water and sewer, gas, telephone and cable shall be done. Coordinate with "Dig Safe" and DPW, N-Star,

BW/SC, Keyspan, Verizon, and CCN for layout of existing utilities. It is recommended that all permits for street openings be filed concurrently with the application of building permits.

Street Openings
The Developer is responsible for determining the scope of street openings. Costs for opening a "guaranteed street" or opening a street after November 15 and before April 15 shall be the responsibility of the developer. DND shall not be responsible for flowable fill required by the Department of Public Works during cold months.

Public Sidewalks
The repair of public sidewalk(s), abutting the Property, is the responsibility of the Developer. The developer should review the proposed project with the Public Works Department (PWD) prior to submitting the project to DND, to determine scope of sidewalk repair/ replacement. If the public sidewalk(s) is scheduled to be replaced by the Public Works Department, it is the responsibility of the Developer to install a temporary surface meeting ADA and PWD requirements. If the public sidewalk(s) is not scheduled to be replaced by PWD, but is in poor condition, as determined by PWD, then both the curbing and walking surface must be replaced, per PWD specifications. If the public Sidewalk(s) is in acceptable condition, as determined by PWD, repairs must be made, meeting PWD specs to return damaged sidewalk(s) to "like new" condition. Permits are required for new curb cuts. If a curb cut is abandoned, the curbing must be replaced and the sidewalk restored.

FENCING – STEEL OR WOOD

All existing one and two family housing units shall be defined, at the street edge, by painted eastern red cedar picket fencing, 42" high, with 4" square capped-posts spaced no greater than 8'-0" O.C. Include one (1) latching gate for each walkway, i.e., two (2) gates for a duplex. Street edge fencing at rehabilitated multi-family housing shall be compatible with the neighborhood otherwise side yard and rear yard boundaries shall be defined by the use of heavy-duty vinyl-covered chain link fencing at least 48" high, with 2" diameter, black, hot-dipped galvanized posts (painted black) no more than 10'-0" apart and set in concrete footings 8" in diameter and at least 30" below finish grade. Provide top and bottom rails as recommended by manufacturer.

DRAINAGE & RETAINING WALLS

Surface Drainage
Surface drainage shall be shown with regard to foundation, walkways, property lines and sidewalks on a grading plan. The area around the existing foundation shall be graded away from foundations (1/2" / FT for a min. of 10 FT) and compacted to insure proper drainage with emphasis on protecting the abutting properties. Where setbacks limit space to less than 10 feet, provide swales or drains designed to carry water away from foundation. Grade changes between existing properties shall be discouraged (mounds, retaining walls, etc.). All surface drainage shall meet the requirements of the appropriate City agencies. If garages are provided, the garage floor shall slope toward the entry door 1/8" per foot minimum. Exterior slabs, walks, and driveways shall be sloped ¼" per foot away from building.

All projects shall attempt to manage storm water on-site to the highest extent possible through the use of low-impact development (LID) techniques such as rain gardens, bioswales, and permeable paving. (SS4)

Subsurface Drainage
Where basements are existing and water infiltration is evident, subsurface drainage shall include a continuous footing drain connected to an engineer-certified subsurface drainage system.

Where basements and/or crawl spaces are provided, subsurface drainage shall include a continuous footing drain connected to an engineer-certified, City approved subsurface drainage system. Pipe shall be surrounded with a minimum of 6 inch of ¾ inch washed or clean gravel that is fully wrapped with fabric cloth. Sump pump covers (if required) shall be mechanically attached with full gasket seal.

Retaining Walls
If the finish grade will result in surface water flowing off site, either onto abutter's property or the public walkway, it is the developer's responsibility to employ a Civil Engineer to resolve the issue through the use of drywell(s) or retaining walls of c.i.p. concrete, interlocking CMU's or fieldstone. The use of pressure-treated timbers is not allowed.

DIVISION 3: CONCRETE

CONCRETE FOUNDATION

Provide damp proofed foundations resting on proper footings on undisturbed or properly compacted soil. Install 1" or greater XSP at exterior of foundations from footing to grade level, after damp proofing has dried and prior to backfill.

The top of the concrete foundation wall is to mirror the foundation wall height of residential buildings within the neighborhood context. The top of the foundation wall is to project at least 3'-0" above the sidewalk curb height (at the front street elevation.) Unless approved by DND, if more than 3'-0" is exposed, then a stucco finish is required. Window wells are **not** permitted.

Housekeeping pads shall be provided under all mechanical equipment and washer/dryers.

BASEMENT SLABS

Install basement concrete slab on 4 inch bed of ½ inch diameter or greater clean or washed gravel, covered with minimum 6 mil polyethylene sheeting lapped minimum of 12 inches at joints; or alternately a minimum of 4 inch uniform layer of sand, overlain with a layer or strips of geo-textile drainage matting, covered with polyethylene sheeting lapped a minimum of 12 inches at joints. 2" and R-10 minimum expanded polystyrene rigid insulation (ESP) or extruded polystyrene insulation (XPS) to be installed under the entire slab to inhibit moisture problems. Control /isolation joints shall be provided in basement slabs. 1" XPS shall be installed vertically at slab edge, 4" high, to provide a thermal break between the slab and the foundation wall.

CRAWL SPACES

If crawl spaces are provided they shall be unvented. The floor of the crawl space shall be covered with 6 mil minimum polyethylene lapped 12" and attached to walls and piers with adhesive and furring strips or a concrete slab over lapped polyethylene and gravel. Crawl spaces shall be fully sealed to prevent outside air infiltration and be provided with supply air at a rate of not less than 0.02 cfm per square foot of horizontal area and an equal size exhaust opening to the conditioned space. (EA3)

PRE-CAST CONCRETE BULKHEAD W/STEEL DOORS

In one and two family homes and townhouses, it is required that all units have both an interior connection to the basement or cellar; rear stairs with pressure - treated stringers (use alternatives to chromated copper arsenate-treated wood) and closed risers to include a handrail, and egress by means of a steel door – concrete bulkhead unit. The use of a pre-cast concrete bulkhead unit complete with neoprene gasket, galvanized through-bolts permanently affixed to the foundation and installed in a watertight manner with a spring-loaded steel entry door is the preferred method. Provide a fully weather- stripped metal or wood door at the base of the bulkhead.

CONCRETE & SUBFLOOR MOISTURE CONTENT

Where flooring is to be installed above concrete or other poured installations (for example to control sound or provide fire protection), the moisture content must meet flooring manufacturers' installation and warranty requirements. Adhesives used in the installation of flooring are subject to failure where concrete moisture content is present. High performance concrete admixtures and/or spray moisture barriers free of all VOC and inhibit mold and bacteria growth are to be used to ensure moisture content acceptable for all flooring applications anticipated for the project.

DIVISION 6A: ROUGH CARPENTRY

For all rough carpentry, use Forest Stewardship Council (FSC) Certified wood whenever possible. (MR2)

MATERIAL EFFICIENT FRAMING

Framing and estimating practices should be used which limit (to 10% or less) the percentage of framing material order in excess of the estimated material required for construction. Panelized construction including structurally insulated walls, roofs and floors, open web trusses and precut framing packages are alternative framing measure that should be pursued. (MR1)

LUMBER

Efforts should be taken to identify competitive pricing on FSC (Forest Stewardship Council) lumber, which is harvested in a sustainable manner. Other "green" considerations with regard to lumber include the use of reclaimed lumber (common in finish floor applications and available locally at a competitive price) and the use of rapidly renewable finish materials like bamboo. (MR2)

PORCHES, DECKS, AND STAIRS

All exterior dwelling entrances shall have weather-protected entries such as canopies, covered porches or recessed alcoves. These entries canopies are to be architecturally compatible when renovating existing buildings. If existing porches and steps are to be rebuilt or new porches and steps are to be added, the front porch and steps shall be framed in arsenic-free preservative pressure-treated (PPT) lumber with (back-primed) painted pine trim and risers for the steps and fir treads and decking. All wood porches, decks, landings, and stairs shall be enclosed with heavy duty painted pressure-treated lattice and (back-primed) painted pine trim. Porch platforms for typical housing should be a minimum of 6" below the Finish First Floor and for adaptable units, flush with the Finish First Floor. All details shall be architecturally compatible with the existing building and neighborhood. PPT shall be used at all locations where framing joins exterior concrete. Where PPT lumber is used, this lumber shall be arsenic free. Use alternatives to CCA (chromated copper arsenate) – treated wood. All deck ledger boards in new construction shall be attached to building with a minimum 3/8" spacers and full flashing shingle fashioned from drainage plain to over framing **or** adhesive membrane strip taped to drainage plane running over ledger board and folded around joists over hanger with adhesive membrane cap patch over each joist.

Front Porches-Renovation: Where porches are compatible with the neighborhood or are being rebuilt on the street side, they shall have 1x4 fir decking or equivalent, square edge, on the first level and square edge over an EPDM single membrane roof (light colored) with a gutter, downspouts, and splash guards on the upper levels, D - Select painted pine trim at skirt boards, platform trim, stair risers and column trim and painted fir top and bottom rails and balusters. Porch ceilings shall be bead board. All stairs shall have closed risers. Preferred decking is either FSC lumber (fir, ipe) or plastic only (HDPE) decking)

Front Porches-New Construction: on the street side shall have 1x4 fir decking or equivalent, square edge, D - Select painted pine trim at skirt boards, platform trim, stair risers and column trim and painted fir top and bottom rails and balusters. Second Floor porches shall be square edge 1 x 4 Fir or equivalent on PPT sleepers over a light colored EPDM single membrane roof with a gutter, downspouts, and splash guards. Porch ceilings shall be bead board. All stairs shall have closed risers. Preferred decking is either FSC lumber (fir, ipe) or plastic only (HDPE) decking) is encouraged to reduce maintenance over the life of the porch.

Rear Porches: 5/4 x 6 PPT lumber may be used only on the first level. The upper levels shall be square edge 1 x 4 Fir or equivalent, or PPT lumber on PPT sleepers over a light colored EPDM single membrane , light colored (in new construction), roof with a gutter, downspouts, and splash guards. All fasteners shall be hot-dipped galvanized zinc or stainless steel. All posts to be 6"x 6" square or 6" turned, or greater as per engineering requirements. Preferred decking is either FSC lumber (fir, ipe) or plastic only (HDPE) decking)

WOOD BLOCKING

Prior to insulating and finishing walls, solid 2 x blocking shall be installed where accessories such as grab bars, towel bars, soap dishes and toilet paper holders are to be located. Insulation materials shall be cut to fit around such blocking. Solid blocking shall also be installed for future installation of grab bars, adjustable counters, and hardware in adaptable units. In projects of more than three units of new construction, all bathrooms shall be blocked to permit the retrofitting of grab-bars in the tub surround area and around the toilet as required by the MAAB Code re: adaptability.

DIVISION 6B: FINISH CARPENTRY

For all finish carpentry, use Forest Stewardship Council (FSC) Certified wood whenever possible.

EXTERIOR DETAILING

The exclusive use of MDO on dormer gables and/or building gables without additional detail is prohibited. The use of details such as decorative applied vents, fish scale shingles, frieze boards or some other contextual treatment, which is compatible with the neighborhood, is required. **Note:** the use of lead coated copper (LCC) decorative panels is forbidden without written approval from DND.

INTERIOR STAIRS

Wood Handrails within units

The use of round handrails and brass wall brackets is limited to basement and attic applications. Wall railings within the unit shall be of a style and size equal to the railing in the free-standing balustrade of the stairway if applicable. Otherwise Brosco # 66 shall be used. All railings must return to wall.

Interior Stairs within units

All stairs shall be constructed with wooden skirt boards; materials and finish shall match stairs or baseboard trim.

INTERIOR DOOR & WINDOW CASING

Existing interior door and window casings are to be savaged, refinished and reused whenever possible. New door and window casings (especially in buildings with historic character) shall match existing. If new door and window casings are to be installed throughout, they are to be painted-Pine 11/16"x2-1/2" Brosco 8710 jambs and head and Brosco #8645 painted-Pine window aprons. All window trim is to be backprimed.

BASEBOARD TRIM

New baseboard (especially in buildings with historic character) shall match existing. If new baseboard it to be installed throughout, a minimum of one piece pine molding, equal to Brosco Stock Molding No. 8385 FJP 9/16" x 3-1/2" (finger- jointed and primed) shall be used for painted applications and No. 8385A for stainable applications. Speed-Base, or approved equal MDF is also acceptable for painted applications.

DIVISION 7: THERMAL AND MOISTURE PROTECTION

Because of its potential to dramatically reduce building energy use, retrofitting the building envelope, including blown in insulation, air infiltration improvements and replacement windows, should be a top priority in rehabilitation projects. Rehab spending should begin outside, with additional shading (awnings, trees), followed by building envelope (insulation, windows) and finally by reducing demand (upgrading heating and cooling systems).

Blown in “green” insulation options are readily available. Also, there are highly regarded non-vinyl replacement windows available.

If the scope of work includes the renovation or addition of bay windows or cantilevers, insulation under these bay windows and cantilevers shall be R-30 minimum.

Thermal bypass inspection is required and all reports must be submitted to DND. (EA3) Air leakage rate must be less than or equal to 2.0 based on IECC climate zones 5 for Massachusetts. (EA2)

INSULATION

Slab on Grade Insulation

Slab on grade & interior of foundation walls shall be R-10 minimum expanded polystyrene rigid insulation (ESP) or extruded polystyrene insulation (XPS). Install per the State Building Code or Energy Star requirements – whichever is more stringent. Insulate to make a vertical separation between slab and foundation.

Basement Insulation & Walls

Fiberglass batt or equivalent insulation (R-19) (EA2) exceeds the R-Value requirements listed in Chapter 4 of the 2004 International Energy Conservation code by at least 5% [more information needed]shall be installed between floor joists in an unheated basement or existing crawl space. This insulation shall be to prevent fibers from becoming air borne. Drywall may also be used.

In lieu of the above insulation, existing foundation walls may be insulated with R-13 FSK insulation. Installation shall be continuous to the underside of the 1st. floor.

Alternatives to fiberglass batt insulation such as cellulose (recycled newsprint), cotton, wool, low-density open-cell polyurethane foam, and recycled-content glass fiberglass should be fully explored. On interior below grade walls, avoid using a separate vapor barrier or below grade wall insulation that can trap moisture inside wall systems.

Basement Walls - If basement or below grade spaces are finished, raise gypsum board ½" off slab and hid gap with baseboard trim.

Roof and Attic Insulation

In structures without accessible space in the attic, insulation shall be installed or increased between the ceiling joists (R-38 is required).

In structures with accessible space in the attic, insulation shall be installed or increased between the roof rafters (R-38 is required). Install full rafter bay 1" polystyrene continuous vent from soffit vent to ridge vent at underside of roof decking.

Attic access panels are required in all buildings where access is not provided by stairs. These access panels shall consist of a removable 'tray' containing 2" rigid insulation, R-10, and shall be installed to prevent a 'cold draft' and excessive heat loss and/or gain through this panel.

Exterior Wall Insulation

Exterior walls above grade are to be insulated with R-20 cavity insulation, or R-13 cavity-plus R-5 insulation sheathing assembly or higher. Insulation under bay windows and cantilevers shall be R-30 minimum.

VAPOR BARRIER, DRAINAGE PLANE, ICE DAMMING

The above grade wall, roof assembly, and foundation wall assembly vapor Management strategy shall be presented for consideration. Please refer to http:/www.buildingscience.com/resources/walls/Vapor Barriers Wall Design.pdf for guidance, or contact the project's ENERGY STAR Homes Project Coordinator. **Drainage Plane -** Provide a drainage plane between exterior cladding and house wrap material.

Ice Damming - A self-adhered bituthene product such as Ice and Water Shield, or approved equal, shall be used on the first 3'-0" of the roof sheathing on all pitched roof applications as well as 3'-0" to both sides of valleys and cheek walls prior to installing the metal drip edge, felt paper and shingles. Roof pitches less than 5 in 12 shall be completely covered with the modified bitumen underlayment.

FLASHING MATERIALS

All plumbing, electrical and other penetrations of walls and floors shall be sealed with polyurethane caulk. The use of *exposed* anodized aluminum flashing anywhere other than step flashing at dormer and cheek walls is prohibited. The following lists of metals are required for the appropriate locations:

- Chimney and cricket locations; sheet Lead flashing.
- Roof parapet cap flashing, EPDM coping or gravel stop, skylight flashing and base flashing, roof junctures, edges, windows, doors and other exterior openings: lead coated copper, or .050 Ga. factory-painted aluminum flashing.
- Provide continuous roll flashing at shed roofs. Flashing shall be factory painted – no mill finish.
- All windows shall receive pan flashing including pan flashing at sills, side flashing. Install pan flashing over building paper at sill and corner patches.
- All sealants shall consist of low or no VOC's.

- Seal all wall, floor, and joint penetrations with rodent proof materials (e.g., in larger opening that can hold corrosion proof metal and expanding foam or caulk). Apply boric acid in holes and cracks likely to be experience cockroach problems. (Note this application must be done by a licensed pesticide applicator.) (SS5)

SEALING MATERIALS

Seal all wall, floor, and joint penetrations with rodent proof materials (e.g., in larger opening that can hold corrosion proof metal and expanding foam or caulk). Apply boric acid in holes and cracks likely to be experience cockroach problems. (Note this application must be done by a licensed pesticide applicator). (SS5)

ROOF

Where feasible, extend eaves (ideally 18 inches to 2 feet, climate conditions permitting) to keep water away from the building. Provide step flashing at intersections of roof and walls with the exception of continuous flashing at metal and rubber membrane roofs. Use metal kick out flashing at the end of roof/wall intersections to direct water away from the wall. (SS4, ID1)

Gutters and Downspouts

All pitched roofs including porches shall have gutters. Vinyl gutters are not acceptable. Gutters shall be sized per Code requirements, and either seamless. 032 Ga., factory-painted aluminum or match existing, securely fastened with straps of the same material and color as the gutters and sealed per manufacturer's recommendations. Gutters/downspouts shall not discharge into gutters or roof below.

Downspouts shall be sized to required roof surface area to match existing or shall be .027 Ga. rectangular downspouts. Downspouts with elbows, both type 'A' and 'B', shall be securely fastened to the sidewall with straps of the same material and color as the downspouts; with a pre-cast concrete splash guard to divert run-off away from the structure at the base of each downspout or tied into the storm drainage as required or empty to a lateral pipe that deposits water on a finish grade a minimum of 5' from the foundation or connected to a pre-cast drywell, as required. Downspouts shall not discharge at or near entryways or sidewalks. (SS4, ID1)

Asphalt Roof Shingles

Fiberglass/asphalt roof shingles or equivalent with a minimum 25 year warranty roof are required. DND will work with applicants to identify and evaluate "green" roof options including HDPE shingles (Enviroshake). Mansard roof designs shall have the appearance of slate.

Flat Roofing

Flat roof applications shall receive light colored, fully adhered compounded rubber sheet elastomer (EPDM) single membrane 0.060" thick sheets as manufactured by Carlisle Syntec Systems or equal, installed by certified installer, and applied per manufacturers warranted specifications. Large roof areas may consist of mechanically fastened and ballasted EPDM.

Roof Ventilation

All pitched roof structures shall have ridge and/or soffit venting to prevent heat build up and premature aging of the roof material. Provide gable vents if required. Design of gable vents shall be approved by DND.

Unvented Roof Assemblies - Pitched roofs using spray foam insulation may be considered.

SIDING

Cementitious Siding

Cementitious siding material, such as Hardi-plank or Cem-plank is the preferred exterior siding material for re-siding of residential, detached 1-3 family buildings. Various exposures combined with painted-wood and/or synthetic-wood products (such as Trim-Tech or Hardi-trim), cornerboards, door/window casings, soffit/fascia trim, skirtboards, and friezeboards/waistbands, cementitious siding replicates the look of wood siding, and requires less maintenance than wood alone. 5/4 trim shall be used with cementitious siding. Glued/finger jointed/joined pine shall not be used on exterior. All installation per manufacturer's

specifications All siding material shall be backprimed. Noted: siding, exterior trim and exposed foundation treatment on buildings in a historical district must be approved by the Boston Landmark's Commission.

Vinyl Siding

The use of vinyl siding is not acceptable. Use of vinyl siding must be approved by DND, if existing and repair is proposed. Vinyl siding starter strips shall be aluminum to ensure a straight/true line. The siding configuration shall be triple three or double four and the thickness shall be .042 minimum, or better, with a 'brushed smooth' finish. Auxiliary accessories shall include inside/outside corners, J-trim and under sill trim pieces. The siding shall be installed over either 1/2" insulating recovery board (w/ nails of sufficient length to penetrate the sheathing properly) or an air infiltration barrier such as Tyvek. Cornerboards, door/window casings, soffit/fascia trim, skirtboards, and frieze boards/waistbands, shall be either wood or cementitious material.

DIVISION 8: WINDOWS / DOORS

WINDOWS & FIXING GLAZING

All windows shall be Energy Star approved. Windows in residential detached 1-3 family rehabilitation projects shall be residential quality, vinyl clad exterior wood sash windows with integral screens, fully weather stripped, with sash locks and pulls. High performance window glazing, argon filled (Low-E), is required meeting or exceeding the following requirements: windows shall have an NFRC rating of (EA4) U-Factor must be less than or equal to 0.30 (to meet energy star) and Solar Heat Gain Coefficient (SHGC) of .40 or less to meet code. Caulk all window and door units with ethylene copolymer caulk, using backer rod (close cell polyethylene Tremco, or equal) as needed. Window shim spaces shall be filled with low-expanding foam sealer. Windows shall have architecturally appropriate exterior casings on 3 sides and a protruding sill. Aluminum windows will only be approved where window dimensions are commercial or oversized. Note: Fiberglass windows are available which can accommodate-oversized dimensions. Historical District requirements must be met where applicable. Wherever possible, window configuration and size shall conform to that of the surrounding neighborhood. When directed by the Landmarks Commission to use wood sashes as an element in historical preservation, it is required that those windows be supplied with TDL (true divided light) configuration and not snap-in muntin grilles. Operable (hopper/awning) windows shall be provided in all basements.

Fixed Glazing - The use of fixed glazing shall be limited to inaccessible skylights, walk-in closets and foyer locations where natural light maybe the criteria rather than ventilation, and sidelights and transoms in foyers where security is not an issue. All other situations must be satisfied with operable sash units.

WINDOW GUARDS & SCREENS

Window guards shall be installed in housing units where a child age 6 or under will be living. Guards should be operable-type interior aluminum or steel bars, clear window opening shall be fully protected with no openings greater than 4 inches, tested to withstand 150 pounds pressure; with quick-release mechanism for emergency exiting (without use of tools or force). Guardian Angel Window Guards meet the requirements of the Kids can't fly program and are preferred by the fire department. Guards should be located where the sill height is accessible to children and is more than 10 Ft. above the finish grade at the window.

Safety Screens - The safety screens are not required. Heavier gauge screens have been used where safety is of concern at the ground floor. The use of safety screens at the first floor is not allowed without DND approval and may not be used as or in place of window guards.

ENTRY DOORS

To conform to energy requirements and security issues, and unless otherwise directed by the Landmarks Commission, it is required that insulated, steel entry doors be the accepted entry door unit for both exterior front, exterior rear, and apartment entries in low rise rehabilitation projects. Door design shall be reviewed by DND. To facilitate entry, both the key-in-lock and the deadbolt (1" throw) shall be keyed-alike. A peep hole shall be provided.

All doors, whether exterior or interior shall have a baseboard-mounted stop, Ives or equal, as part of the 'hardware package' to prevent damage to wall finishes. Stop finish shall match door hardware finish.

STORM/SCREEN COMBINATION EXTERIOR DOORS

All exterior doors shall be 'embossed', rather than decorative plastic applied molding, to prevent 'sagging' when used in conjunction with storm doors. The use of Harvey 'Carefree' (or approved equal) combination storm and screen doors at entries, front and rear, is required for rental units. Such doors shall be properly sized for the opening and the frame caulked with a phenolic caulking material (color to match). In applications involving owner/ tenant detached or semi-detached structures, units shall require storm/ screen doors front and rear.

EGRESS TO PATIO OR DECK

The use of sliding doors to access the exterior is discouraged. Coupled with posing a security issue and probable early failure of the sliding mechanism, alternative methods should be sought. The use of a security bar is required whenever a slider is the DND approved method of egress. Patio/deck doors should step down to allow out-swinging doors to open when snow is present.

DOOR HARDWARE

Exterior doors (2-3/4" backset hardware locksets, polished brass), aluminum and hardwood adjustable thresholds, weather-stripping, interior unit entry/ exit doors (2-3/4" backset hardware locksets and keyed-alike deadbolts, hardwood threshold), Bathrooms / Master bedrooms (privacy sets), other interior unit doors (passage). Finish: bright brass (polished chrome on bathroom side), knob style: 'Orbit', Schlage F10 or equal except Schlage 'Accent' lever handles or equal, throughout at Accessible Unit. Door stops to be baseboard-mounted. **Note: Lever handles to be used in Adaptable units.**

DIVISION 9: FINISHES

SOUND ATTENUATING BLANKETS

In renovations were possible, sound insulation shall be installed in floors, corridors and party walls between units, with a minimum STC of 50. PVC soil stacks shall be wrapped or the chase packed with approved sound insulation.

DRYWALL CORNER BEADS

Whenever installing metal corner beads on wood-framed partition corners, the practice of using a 'clencher' is not permitted. The metal accessory should be mechanically fastened using 4d galv. box nails or drywall screws.

BATHROOM WALLS

Though not a requirement, a ceramic tile tub-surround is the preferred choice, particularly in instances where handicap adaptability (retrofitting) is an issue. Ceramic tile of at least 4 1/4" square should be installed in Thin-set on a cement backer board. Durock, Wonder-board or other approved equal 1/2" thick glass fiber-reinforced cement tile backer as a substrate, shall be installed with galvanized roof nails per manufacturer's recommendations. The use of MR (moisture resistant) 'green board' drywall is not allowed as a tile backer. The tile shall extend a minimum of 6'-0" above the finish floor, (A.F.F.), complete with all necessary trim pieces and caps, including a soap dish without a grip bar. Use MR (moisture resistant) in areas without tile in full bathrooms. (ID2) Seal all openings behind tub and shower enclosures to minimize airflow.

BASEBOARD TRIM

Rubber cove base shall not be used anywhere except on the toe space of kitchen and bath cabinetry. FSC certified wood base shall be provided in all other areas. **FLOOR FINISHES - GENERAL**

Floor finishes are to be durable, easy to maintain provide a long useful life and eventually recyclable. In addition flooring finishes are not to contribute to respiratory ailments due to off gassing overtime. This is a major concern to DND and the neighborhoods of Boston. **All adhesives shall consist of low or no VOC's.** (Also See Concrete & Subfloor moisture content) and following manufacturer standard.

Ceramic Tile

Ceramic Tile is allowed in the following locations: kitchen, bathroom, entry and vestibule.

Engineered Wood & Hardwood Flooring

Engineered Wood/Hardwood floor is allowed throughout dwelling unit except for kitchen and bathroom. If existing flooring is hardwood, floor refinishing is encouraged. (ID2)

FLOOR FINISHES – COMPOSITE FLOORING

Composite Plank or Tile flooring may be allowed with approval. These flooring finishes must be highly durable, easy to maintain, made of recycled materials, and be eventually recyclable. Common composite flooring types are listed below.

The use of sheet good is not allowed without approval. Incidental tears or scratches in sheet good can mean complete replacement of flooring. If approved sheet goods shall not be used as a standard floor treatment throughout dwelling units and will be limited to entryways, bathrooms, and dining rooms.

Linoleum

Linoleum is allowed in common stairs and hallways of multifamily buildings and in kitchen, bathroom, entry and vestibules within dwelling units. To ensure minimum out-gassing and durability and where possible, all linoleum shall be equal to Marmoleum.

Wood Laminate Flooring

Wood laminate flooring is a material composed of a core layer made of medium-density fiberboard or high density fiberboard, a decorative layer containing a photo rendering to mimic wood and a protective wear layer designed to resist abrasion, stains, fading, etc. Installation conditions and the warranty of Wood laminate flooring will be reviewed upon submission of product documentation. If approved, wood laminate flooring can be installed in living rooms, dining rooms and bedrooms.

Vinyl Composition Tile (VCT):

The use of vinyl flooring, either sheet goods or vinyl composition tile (VCT) is not allowed without approval. If approved, VCT can only be installed in kitchens, bathrooms, common stairs (treads and risers) and hallways. Water based adhesives shall be used. (MR2) VCT adhesives must have VOC content less than or equal to 50 g/L less water.

FLOOR FINISHES – CARPET

Carpet may not be used without approval. The use and location of carpeting shall limited sharply. All carpeting and padding shall meet the Carpet and Rug Institute (CRI) indoor air quality standards and Green Label Plus Program. (MR2)

Carpeting should itself be low-emitting and adhered to the floor with low emitting adhesives. Where possible, use carpet with recycled content fiber and the ability to be recycled at the end of its usable life. Where used, carpeting of approved quality (26 Oz. minimum fabric face weight per square yard, level loop), secured with tackless wood-strip fasteners and synthetic jute or foam padding is the standard for unit living rooms and bedrooms. Where approved, hallways, living rooms and bedrooms shall receive carpeting. (Dining rooms may also be covered with level loop carpet, with review of sample by DND). Where carpet is approved within multifamily dwelling units at least one bedroom in a 2 or 3 bedroom unit must use engineered wood flooring or an approved composite flooring material. Carpet is not allowed in a one bedroom unit.

Carpeting (in 1 to 3 family dwellings) shall be restricted to the following locations: Stairs within units, hallways, one bedroom in a 2 BR unit and two bedrooms in a 3(+) bedroom unit. if approved, common stairs and hallways shall have a minimum of 28 oz. carpet and heavy padding. Indoor carpet and carpet pad adhesives must have VOC content less than or equal to 50 g/L less water. (MR2)

BATHROOM FLOORS

In order to ensure minimum out-gassing and durability, the entire full bathroom floor shall be either tiled with a floor grade tile, non-slip glazed or unglazed, and include a sanitary base (tile trim piece or cap) at all wall and floor junctures, or linoleum (where possible use Marmoleum or equal) with one-piece painted wood or MDF baseboard. Vinyl composition tile is not approved for full bathroom floors. (ID2)

BASEBOARD TRIM

Vinyl cove base shall not be used except on the toe space of kitchen and bath cabinetry.

KITCHEN RANGE BACKSPLASH

Whenever the area behind the cooking range is painted gypsum wallboard, ceramic tile shall be installed and trimmed with stainless steel J-trim. The backsplash shall be as wide as the range, and fit from the underside of the cabinet above or the ducted range hood down to 30" A.F.F. The area behind the kitchen range should be easily cleaned.

INTERIOR PAINT SCHEDULE

Paints shall be limited to Benjamin Moore, Sherwin Williams, Pratt & Lambert, Martin-Seynour, Devoe, Reynolds, California or equal quality products applied at the rate specified by the manufacturer. All paint shall be limited to low (50g/L) or no VOC (MR2)

Gypsum Drywall – Ceilings - 1 coat of latex-base primer and 1 coat latex-base interior flat (ceiling white) paint. Kitchens and bathrooms shall receive 1 coat primer and 2 coats semi gloss odorless Alkyd enamel. Existing ceilings shall receive stain/mold kill primer. Sand finish ceilings are not permitted in kitchens or bathrooms. All paint shall be low or no VOC.

Gypsum Drywall- Walls - 1 coat latex-base primer and 2 coats interior latex-base egg shell paint. Kitchens and bathrooms shall receive 1 coat primer and 2 coats semi gloss odorless Alkyd enamel. Existing ceilings shall receive stain/mold kill primer. All paint shall be low or no VOC.

Plaster Ceilings - 1 coat latex-base primer and 2 coats latex-based interior flat (ceiling white) paint. Kitchens and bathrooms shall receive 1 coat primer and 2 coat semi gloss odorless Alkyd enamel. All paint shall be low or no VOC.

Plaster Walls - 1 coat latex-base primer and 2 coats latex-based egg shell paint All paint shall be low or no VOC.

Stained Woodwork - 1 coat oil-base interior wood stain and 2 coats satin or semi gloss polyurethane varnish. VOC content less than or equal to 250 g/L. All stain shall be low or no VOC. (MR2)

Natural Finish Woodwork - 1 coat sanding sealer and 2 coats satin or semi gloss polyurethane varnish.

Clear wood finishes should contain VOC content less than or equal to 350 g/L (varnish) and 550 g/L (Lacquer). All varnish shall be low or no VOC. (MR2)

Painted Woodwork - 1 coat interior enamel undercoat and 2 coats interior semi gloss odorless alkyd enamel. All paint shall be low or no VOC.

Ferrous Metal - 1 coat rust-inhibiting (Rust-o-leum or equal) primer, 1 coat interior enamel undercoat and 1 coat interior semi gloss odorless alkyd enamel. Anticorrosive and antirust paints applied to interior ferrous metal substrates should contain VOC contents less than or equal to 250 g/L. All paint shall be low or no VOC. (MR2)

EXTERIOR PAINT SCHEDULE

Paints shall be limited to Benjamin Moore, Sherwin Williams, Pratt & Lambert, Martin-Seynour, Devoe, Reynolds, California or equal quality products applied at the rate specified by the manufacturer. All paint shall be limited to low or no VOC.

Painted Wood Finish - 1 coat exterior primer and 2 coats semi gloss alkyd enamel. All new exterior trim and siding shall be back primed. All paint shall be low or no VOC.

Transparent Wood Finish - 1 coat oil-base sealer and 2 coats spar varnish. All varnish shall be low or no VOC.

Zinc Coated Metal - Whenever using galvanized metal, the surfaces shall be cleaned with a non-petroleum-based solvent, removing pre-treatment, oil and contaminants from the surface prior to applying 1 coat galvanized metal primer, 1 coat interior enamel undercoat and 1 coat interior semi gloss odorless alkyd enamel. All paint shall be low or no VOC.

Consult with DND De-leading Program for methods to remove paint effectively without eliminating architectural details.

DIVISION 10: ACCESSORIES

TOILET ACCESSORIES & SHELVING

All full bathrooms shall receive 2-24" towel bars, robe hook, shower curtain rod, toilet paper holder, mirror-front medicine cabinet. Finish shall be polished chrome.

All half bathrooms shall receive 2 towel bars, robe hook, toilet paper holder, and wall mirror. Finish shall be polished chrome.

Closet shelving - White, vinyl coated steel shelf w/ integral clothes rod by Closet Maid, or equal.

DIVISION 11: APPLIANCES

All applicable appliances shall be Energy Star rated. (EA9) Non-vented combustion appliances are not allowed in DND projects. (EQ2)

- Range hood vented to outdoors. Exhausting kitchen fans are to meet requirements of ASHRAE 62.2.
- Garbage Disposal, 1/2 HP minimum.
- **30" Gas range with self-cleaning oven - required for home ownership development.**
- Energy Star rated Dishwasher that use 6.0 gallon or less per cycle.
- Energy Star rated Frost-free Refrigerator, adaptable for installation of an automatic ice maker, sized per number of Bedrooms as follows:

Studio Unit	12 Cu. Ft.
1 Bedroom Unit	14 Cu. Ft. minimum.
2 Bedroom Unit	18 Cu. Ft. minimum.
3 or more Bedrooms	20 Cu. Ft. minimum.

- Energy Star rated clothes washer (commercial washer supply by other is excluded)

DIVISION 12: FURNISHINGS

All medium-density fiberboard (MDF) used in cabinetry and countertops shall be formaldehyde free.

KITCHEN CABINETS AND BATHROOM VANITIES

Laminate or solid-oak formaldehyde-free doors/ frames. Merrilat, Tri-Pak or equal with dull chrome 4" wire pulls.

KITCHEN COUNTER

High pressure, .050 thick, 1 piece (post-formed) countertop square-edged w/ integral 4" coved backsplash. Use water-based adhesives.

WINDOW SHADES

All windows (except basement) shall receive properly sized window shades: fiberglass-coated, vinyl plastic, fire-retardant, fade-resistant roller shades with large diameter cotton cord attached to slat. Mini-blinds are not acceptable.

DIVISION 15: MECHANICAL

FIRE PROTECTION

Fire Sprinkler Systems

Drawings of projects consisting of more than three units shall have an approval stamp and signature from the Fire Department.

When designing Fire Sprinkler systems, only in exceptional situations will standpipes and sprinkler piping be allowed to be exposed below finished ceilings. It is required that all efforts be taken to use concealed

pendant type sprinkler heads and trim plates. Soffits and chases may be utilized, but only after review by DND Design Staff.

PLUMBING

Plumbing Fixtures

Plumbing fixtures are to be provided which reduce water consumption. The following fixture flow rates are recommended to reduce water consumption in new construction and renovation projects. (WE3)

- Kitchen faucets - average flow rate of less than or equal to 2.0 gpm
- Lavatory faucets - average flow rate of less than or equal to 1.5 gpm.
- Aerators can be used to achieve recommended flow rate for kitchen and lavatory faucets.
- Shower heads – average flow rate of less than or equal to 2.0 gpm.
- Toilets with average flow rate of less than or equal to 1.1 gpf.

The following is a list of minimum standard fixtures, faucets and accessories:

P-1 In Kitchens without dishwashers, the sink shall be a double-bowled, Elkay PSR3322, 33" x 22", 20 Ga. stainless steel unit with four holes or other approved equal; to accommodate a Delta Model No. 400 (low flow 2.5 gpm), chrome, single handle faucet with spray attachment or other approved equal. Otherwise, an Elkay PSR2522, 25" x 22" or other approved equal, 20 Ga. stainless steel unit with four holes shall be used.

P-2 Bath Lavatory and faucet; 'cultured marble' integral bowl, front overflow and backsplash. Moen or Delta (2.5 GPM) single lever chrome washerless faucet with aerator, flow restrictor, lift rod and pop-up drain.

P-3 Toilet; two piece close-coupled siphon jet vitreous china (white) (1.4 GPF or better) flush low consumption, round bowl toilet, 12" rough, or equal with a consumer rating of 70 or above. The toilet rated at 70 by Consumers Report (June '98) was the Universal Rundle Atlas Model # 4079. The toilet shall include a Bemis, or equal, solid plastic closed seat and cover, and a chrome supply and flexible riser.

P-4 Bath tub; 60" x 30" x 14" American Standard, white, 'Americast' enameled steel w/sound-deadening polymer backing, non-slip bottom, chrome plated B/W/O with diverter and strainer and Symmons S96-2X chrome pressure-balancing anti-scald bath/shower valve, or equal, with chrome spout and shower head (2.5 GPM). Steel tubs are not permitted.

Aerators *(Specification under development)*

Water Supply

Insulate *all* hot and cold water supply pipes and *all* heating pipes with R-4 insulation throughout the structure. Insulation shall be properly installed on all piping elbows to adequately insulate the 90-degree bend. (EA7) Take care to seal all floor, ceiling and wall penetrations with approved draft stop material.

Underground water service: ¾" type K copper, hot and cold water piping: Type L., drain, waste, and vent piping:

Washing Machine Hook-up

Laundry hook-ups are required for each unit in One and Two Family residential construction. If a Laundry hook-up is installed within a Unit above living space, a plumbed floor tray shall be provided. For Affordable Units, one, two and multi-family closet space for the washer and dryer should be placed side-by-side. Dryer power source should be gas rather than electric. (ID2)

Water Heater Tanks

If a tank water heater is installed within a Unit above living space, a plumbed floor tray shall be provided. (ID2)

Hose Bibbs
Freeze-proof hose bibbs, or spigots, must be provided in sufficient number to allow watering of all lawn areas and plantings.

All visible pipe penetrations through walls, floors, and cabinets (including interiors) shall be sealed and covered with escutcheons.

Heating Equipment
Design and size HVAC equipment properly using the latest editions of ACCA Manuals J, S &D, respectively, the ASHRAE Handbook of Fundamentals or an equivalent computation procedure. (EA6) (EQ6) Space and water heating equipment that involves combustion must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting.) (EQ2) Provide housekeeping pads under new mechanical equipment.

Ground Source Heat Pumps
Refer to Energy Star Qualified Homes, National Program Requirements for Heating Equipment (EA6)

Sealed-combustion FHW (Forced Hot Water) System
(Required at 1 and 2 family – rehabilitation projects)

Keep the system (including boiler and distribution pipes) entirely within the conditioned envelope. (EA5) Provide high efficiency sealed-combustion Burnham Revolution Series, Weil/McLain Gold Series, or equal gas-fired boiler with an A.F.U.E., (Annual Fuel Utilization Efficiency) of 85 or better for gas FHW. Domestic hot water heater shall be an Amtrol, 'Superstor' or equal 40 gal. Insulated Stainless steel storage tank w/ Sparco or equal tempering valve and separate zone valve and/or circulator, Slant Fin 'Fineline 30' or other approved equal hot water baseboard radiation element complete with bleeder valves, cover and trim in accordance with IBRM specifications. System shall be complete and operational prior to occupancy.

Particular attention to location of vent terminations re: walkways and windows must be made for design and Code compliance.

FWA (Forced Warm Air) System
Provide a high efficiency or hydro-air system to heat warm air. Gas fired boiler shall have an A.F.U.E. (Annual Fuel Utilization Efficiency) of 92 or better. Provide new flue pipe with sections fastened with sheet metal screws as per Code. Provide new supply and return sheet metal plenums, required safety switches, thermostat and all wiring necessary for proper operation. Provide all sheet metal ducting, properly secured with straps, sealed with mastic, according to code on both supply and return with dampering capabilities to each habitable room. All ductwork shall be sealed per MA state Building code (780 CMR J4.4.8.2 Duct Sealing), and Energy Star Homes guidelines. All ducts shall be located within the envelope of the house. All grilles and registers shall meet specifications for that particular application, ie., floor or wall discharge. This system shall be adaptable for A.C. If utilizing a FWA system the DHW shall be provided by a device with an efficiency (EF) greater than 6.1 with sealed or direct vent construction.

(EQ7)

For Oil-fired applications, all the above, and include a Beckett, Carlin or other approved equal retention head oil burner, 275 Gal. storage tank w / plastic sheathed soft copper supply buried in the floor slab and a required 'kill switch' located in the living area near the basement stairs. Oil furnace AFUE shall be 85 or higher.

Note: Atmospheric/modular boilers are not permitted.

Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be less than or equal to 3.0 cfm at 25 Pascals per 100 square feet of conditioned floor area (for each installed system). (EA5)

Gas Water Heaters
(Specification under development)

- *High-efficiency storage water heater – Energy Factor greater than or equal to 0.53 (80 Gallon)*
- *High-efficiency storage water heater – Energy Factor greater than or equal to 0.57 (60 Gallon)*
- *High-efficiency storage water heater – Energy Factor greater than or equal to 0.61 (40 Gallon)*
- *Storage or tank less water heater – Energy Factor greater than or equal to 0.8*
- *(EA7)*

Thermostat Controls
The use of programmable set-back thermostats is required to promote energy savings. Install Energy Star labeled programmable thermostat (except heat pumps and hydronic systems). (EA6)

Residential Refrigerant
Refrigerants used in DND projects should not contribute to ozone depletion. Install non-HCFC refrigerants (e.g., R-410a) (EA11)

VENTILATION

Non-vented combustion appliances are not allowed in DND projects. (EQ2) In multifamily developments bathroom exhaust systems can either operate at low speed continuously with a manual booster setting or operate intermittently (when switched on) to exhaust at a high speed. Continuously operating systems are preferred by DND.

Where Energy Recovery or Heat Recovery Ventilation Systems (ERV/HRV) are proposed to provide heat transfer between the incoming outdoor air stream and the exhaust air stream, these systems shall be independent systems for each dwelling unit for the purpose of supplying fresh air to tightly insulated unit when natural ventilation with windows is unlikely during heating season. Central ERV/HRV for multiple dwelling units is not allowed without system commissioning by certified professionals to ensure design flow rate is maintained within each unit. ERV/HRV systems must be listed by a certified testing lab. *(EQ4)*

Bathroom Ventilation System
At full bathrooms, install exhaust fan designed for (EQ4) continuous operation such as Panasonic 110 CFM "super quiet" .5 sone fan unit (Panasonic FV08VQ at 2 bedroom units and FV11VQ at 3 bedroom or larger units) connected to the outdoors with 6" insulated duct discharging through a galvanized steel or aluminum wall or roof cap with a back draft damper, insect screen and wind hood. Ducting for kitchen and bath exhaust shall run straight to the exterior and pulled tight without kinks or bends. Controls shall be 'Airtrack Programmer' by Tamarack Technology of Wareham, MA, or equal to boost ventilation by 50%, adjustable from 15 to 60 minutes for bathroom exhaust discharge. All bathroom doors shall be undercut 1/2" to promote required changes throughout. Consult the Energy Star Homes project coordinator for alternative approved ventilation strategies.

Vented Range hoods
Vented range hoods must be used and vented to the exterior.

Dryer Ventilation
All dryers shall be vented to the exterior. (ID2)

Contaminant Control
Upon installation, seal all permanent ducts and vents to minimize contamination during construction. Remove all seals after all phases of construction are completed. (EQ8)

DIVISION 16: ELECTRICAL

The electrical components shall include, but are not limited to the following:

OUTLETS, SWITCHES & WIRING

Ceiling Outlets - Living Rooms, dining Rooms, and bedrooms require a ceiling-mounted fan box and controlled by switching, whether or not a fan is intended to be used. The installation of a blank canopy

(white) for future use will complete the installation. If the room has one entrance door, one single-pole switch is required. If the room is accessible from two locations, two three-way switches are required. Switches should be located on the knob side of the door, approximately 48 A.F.F. In bedrooms and living rooms, wire half of a duplex receptacle to a switch at the entry door. Conveniently located load center with circuit breakers in each unit.

- Switched outlets in Living Room and Bedrooms.
- 3 way switching for living rooms, kitchens, and hallways.
- 20 Amp circuits in Living Room and Master Bedroom for AC units under windows.
- Provide outlet in basement for future dehumidifier.
- All electrical devices at exterior walls and top floor ceilings should have airtight boxes or 'polypans'.

Wiring - To the greatest extent possible, RoHS (Restriction of Hazardous Substances) compliant wiring should be used for all wiring types. RoHS wiring is typically lead free and includes reduced levels for cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE) substances, which have been found to be harmful to human health.

METERING

Public and Common Metering - In dwellings with two or more units, a separate Public Meter with all common area circuitry shall be provided. Meters and T boxes at exterior shall be mounted on backer boards such as molding-trimmed MDO fastened to the sheathing.

Sub Panel metering - Whenever running a service line from the Main panel board to a sub panel board, the use of aluminum wire is not permitted. The sub panel shall be fed by a copper conductor with ground.

SECURITY ALARM SYSTEM

Door and window contacts at lower levels and any easily accessed upper windows and doors.

- Security alarm system: door and window contacts at lower levels and any easily accessed upper windows and doors.

LIGHTING, CEILING FANS, OCCUPANCY SENSORS

All lighting shall meet Energy Star Qualified Homes National Program Requirements for Lighting Equipment – Energy Star Qualified CFLs or pin-based lighting in 80% of fixtures in RESNET-defined Qualifying Lighting Fixture Locations, shall be installed approved by DND. (Also see Advanced Lighting Package (EA8) requirements, which require a minimum of 60% hardwired Energy star fixtures and 100% Energy star qualified ceiling fans.) Lighting shall use compact fluorescent bulbs whenever possible.

- Attempts at energy conservation re: lighting levels should not sacrifice those light levels, but rather match them, (foot candles or lumens of lighting), to the needs of the areas illuminated.
- Front and rear porch lights in one and two family rehabilitation projects.
- Ceiling fixtures in building common areas, entry foyers and unit hallways, stairwells, kitchens including additional fixture over sink, bathroom ceiling and over mirror, walk-in closets and basements.

Bedroom Lighting must be provided. A switched, ceiling mounted, light fixture shall be provided.

Clothes Closet Lighting must be provided in walk-in closets. An external switched, wall mounted, light fixture over door head shall be provided.

Ceiling Fans - All ceiling fans must be Energy Star qualified. (EA8)(EA9)

Occupancy Sensors - All Bathrooms and Bedrooms shall be equipped with occupancy sensors. (EQ5)

VOICE AND DATA SERVICE

Phone jacks or modem connections shall be installed in the Kitchen, Living Room and all Bedrooms. All projects receiving low-income housing tax credits will be required to install a high-speed data network.

- Telephone jacks in Kitchens, Living Room and all Bedrooms.
- Cable jacks in Living Room and Master Bedroom.

CLOSED CIRCUIT SECURITY CAMERA SYSTEM

Note where required by the Building Code closed circuit security camera system must be provided at each entrance to the building allowing occupants to observe who is seeking entrance to the building with their television set. (10 or more apartments.)

FIRE/SMOKE DETECTORS

Smoke detectors shall be hard-wired to comply with the Electrical Code. Additionally, any smoke detector within 20 FT of a kitchen or bathroom shall have a Photoelectric head with a battery back-up to comply with the Fire Marshall's regulation, currently in effect, which shall include a detector in every bedroom. Thus, with battery back-ups, storms and / or black outs will not jeopardize the fire protection provided. A carbon monoxide monitor must be installed on each floor. (EQ2)

- Hard-wired smoke detectors.